

ORIGINAL ARTICLE

Treponema pallidum Hemagglutination (TPHA) Positivity Rates in HIV-Infected and Non-HIV-Infected Cases

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ABSTRACT

Background: Syphilis is a common co-infection among patients with human immunodeficiency virus (HIV) infection. Monitoring its prevalence is essential for effective public health control and prevention strategies.

Methods: This retrospective study evaluated *Treponema pallidum* hemagglutination (TPHA) test results of patients followed at the İstanbul Training and Research Hospital, Department of Infectious Diseases and Clinical Microbiology, between January 2019 and December 2021. Demographic and laboratory characteristics of HIV-infected patients were also analyzed.

Results: A total of 1,436 patients with available TPHA results were included in the study. TPHA positivity was detected in 22.3% of all cases. Among these, 353 patients (24.6%) were HIV-infected. The age distribution did not significantly differ between TPHA-negative and TPHA-positive subgroups ($p > 0.05$). However, the proportion of male patients was significantly higher in the TPHA-positive subgroup compared with the TPHA-negative subgroup ($p < 0.05$). Marital status distribution did not differ significantly between TPHA-negative and TPHA-positive groups ($p > 0.05$).

Conclusions: Given the increasing coexistence of syphilis and HIV infections in recent years, it is essential that individuals diagnosed with one sexually transmitted disease (STD) be screened for the other. Raising awareness among healthcare professionals and educating patients about the coexistence and transmission of sexually transmitted infections remain crucial for effective disease control and prevention.

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KEYWORDS

HIV, TPHA, syphilis

INTRODUCTION

The retrovirus HIV is the etiological agent of the long-lasting acquired immunodeficiency syndrome (AIDS) pandemic [1]. HIV is a viral agent that causes acquired immunodeficiency syndrome (AIDS) that affects the immune system [2]. Syphilis, caused by *Treponema pallidum*, is a systemic disease that can coexist with HIV due to shared transmission routes, particularly sexual contact [3,4]. The two infections exhibit epidemiol-

ological similarities and may interact to alter immune responses, complicate diagnosis, and impact treatment outcomes after initiation of antiretroviral therapy (ART) [5].

The causative organism *T. pallidum* was first identified in 1905. Serological testing remains the cornerstone of diagnosis, as clinical manifestations vary by disease stage. Primary syphilis presents with a painless chancre, while secondary syphilis is characterized by rash, lymphadenopathy, and systemic symptoms. The disease may enter a latent phase before progressing to tertiary syphilis, which may involve the cardiovascular or nervous systems [6,7]. Co-infection of syphilis and HIV is difficult to manage when it occurs together and tends to increase morbidity, and syphilis has been associated with an increased risk of HIV transmission in high-risk groups [8].

This study aimed to investigate *Treponema pallidum* hemagglutination (TPHA) positivity rates among HIV-infected and non-HIV-infected individuals and to analyze the demographic and laboratory characteristics of HIV-infected patients.

MATERIALS AND METHODS

Study Design and Population

This retrospective study included patients followed at the Istanbul Training and Research Hospital, Department of Infectious Diseases and Clinical Microbiology, between January 2019 and December 2021. TPHA test results and relevant clinical data were retrieved from the hospital database.

Data Collection

Demographic and laboratory variables, including age, gender, marital status, anti-HIV titers, absolute CD4 count, and CD4/CD8 ratio, were recorded for all HIV-positive cases.

Ethical Approval

Ethics approval was obtained from the Ethics Committee of İstanbul Training and Research Hospital (Date: 2021/Approval No.: 3,005).

Statistical Analysis

Descriptive statistics included mean, standard deviation, median, minimum, and maximum values. Data normality was tested using the Kolmogorov-Smirnov test. The Mann-Whitney U test was used for comparisons of quantitative variables, while the chi-squared test was used for qualitative variables. Statistical significance was set at $p < 0.05$. Analyses were performed using SPSS version 28.0.

RESULTS

A total of 1,436 patients with available TPHA results were included. The overall TPHA positivity rate was 22.3%. Of these patients, 353 (24.6%) were HIV-infected. The mean age did not differ significantly between HIV-positive and HIV-negative groups ($p > 0.05$). However, the proportion of male and single individuals was significantly higher among HIV-positive patients ($p < 0.05$). TPHA positivity was significantly higher in the HIV-positive group (34.6%) compared with the HIV-negative group (18.3%) ($p < 0.05$).

When comparing TPHA-positive and TPHA-negative subgroups, age and marital status did not differ significantly ($p > 0.05$), but the proportion of males was higher in the TPHA-positive subgroup ($p < 0.05$). Among HIV-positive patients, absolute CD4 counts, CD4/CD8 ratios, and HIV-RNA levels showed no statistically significant differences between TPHA-positive and TPHA-negative groups ($p > 0.05$).

Demographic and laboratory characteristics are presented in Tables 1 - 3.

DISCUSSION

HIV and syphilis frequently affect similar populations due to shared transmission pathways, particularly sexual contact. Therefore, it is recommended that all individuals presenting with syphilis undergo HIV testing, and conversely, all HIV-positive patients should be screened for syphilis. Co-infection may alter the clinical presentation of syphilis, often leading to atypical or more severe manifestations [9].

In our study, TPHA positivity was significantly higher among HIV-positive patients (34.6%) compared to HIV-negative cases (18.3%). Lakshmi et al. found syphilis seropositivity in 11.1% of HIV-positive and 5% of HIV-negative cases [10]. Similarly, Somia et al. reported syphilis positivity in 28.6% of HIV-positive men who have sex with men (MSM) and 10% in HIV-negative MSM [11].

Aydin et al. (2022) reported syphilis co-infection in 30.2% of 474 HIV-positive patients with a mean age of 37 years, 90.5% of whom were male [12]. In another study, in which a total of 308 HIV-infected cases were included, 40 patients were found to be TPHA positive, and no statistical difference was observed between TPHA (+) and TPHA (-) subgroups with regard to absolute CD4 counts, age and marital status, similar to our study [13].

In another study from our country, a total of 244 HIV (+) cases were included, and TPHA was found to be positive in 47 (19.3%) cases; no statistical difference was found between TPHA (+) and (-) subgroups in terms of age, absolute CD4 counts education status [14]. In the study of Weldesenbet et al., a comprehensive examination was conducted on 280 cases, with 8 patients identified as HIV-infected and 272 as non-HIV-infected.

Table 1. Demographic and laboratory features of the cases.

Variable	Category	Mean $\pm$ SD/n (%)
Age (years)		37.6 $\pm$ 12.8
Gender	female	404 (28.1%)
	male	1,032 (71.9%)
Marital status	unmarried	626 (43.6%)
	married	524 (36.5%)
	unknown	286 (26.4%)
Absolute CD4 count (cells/mm ³)		563.1 $\pm$ 401.2
HIV status	negative	1,083 (75.4%)
	positive	353 (24.6%)
TPHA result	negative	1,116 (77.7%)
	positive	320 (22.3%)

Table 2. Distribution of demographic and laboratory features between HIV (–) and HIV (+) subgroups.

Variable	Category	HIV (–) Mean $\pm$ SD/n (%)	Median	HIV (+) Mean $\pm$ SD/n (%)	Median	p
Age (years)		37.6 $\pm$ 13.3	34.8	37.5 $\pm$ 11.2	36.7	0.395 ^m
Gender	female	362 (33.4%)		42 (11.9%)		0.000 ^{x2}
	male	721 (66.6%)		311 (88.1%)		
Marital status	unmarried	419 (50.1%)		207 (66.1%)		0.000 ^{x2}
	married	418 (49.9%)		106 (33.9%)		
TPHA result	negative	885 (81.7%)		231 (65.4%)		0.000 ^{x2}
	positive	198 (18.3%)		122 (34.6%)		

^m Mann-Whitney U test, ^{x2} Chi-squared test.

Table 3. Distribution of features between TPHA (–) and TPHA (+) subgroups.

Variable	Category	TPHA (–) Mean $\pm$ SD/n (%)	Median	TPHA (+) Mean $\pm$ SD/n (%)	Median/p
Age (years)		37.4 $\pm$ 13.0	34.9	38.2 $\pm$ 12.1	36.2/0.167 ^m
Gender	female	345 (30.9%)		59 (18.4%)	0.000 ^{x2}
	male	771 (69.1%)		261 (81.6%)	
Marital status	unmarried	480 (55.5%)		146 (51.2%)	0.210 ^{x2}
	married	385 (44.5%)		139 (48.8%)	
Absolute CD4 count		529.7 $\pm$ 377.4	486.5	626.1 $\pm$ 437.5	556.0/0.090 ^m
CD4/CD8 ratio		0.308 $\pm$ 0.402	0.110	0.389 $\pm$ 0.550	0.130/0.653 ^m

^m Mann-Whitney U test, ^{x2} Chi-squared test.

ed; 1.76% of patients were syphilis positive, and all 8 HIV (+) patients were negative for syphilis [15]. HIV (+) patients were included in another study and it was determined that 42 cases (47.7%) were TPHA positive and 74 of them were males [16].

In the study conducted by Lim et al., the study population was predominated by males, constituting 93.4% of the cases, with a mean age of 41.4 years; syphilis co-infection was found to be 12.3% in a total of 793 cases [17].

In the study of Bourauche et al., the frequency of syphilis was 16.4% in 1,381 males and 1,427 females [18]. The primary objective of this study was to assess the prevalence of hepatitis B (HBV), hepatitis C (HCV), and syphilis among cases infected with HIV; a total of 2,087 HIV-infected cases were evaluated, and rapid plasma reagin (RPR) positivity was found in 19.6% of patients [19].

These rates are in line with our findings, further supporting the association between male gender, single marital status, and higher syphilis prevalence among HIV-positive individuals.

The relationship between syphilis and HIV progression remains complex. Some studies suggest that syphilis may transiently increase HIV viral load and reduce CD4 counts, both of which improve after syphilis treatment [20].

In the study of Tessema et al. in blood donors, 607 (9.5%) of a total of 6,361 blood donors had multiple infections with at least one infection, and overall seroprevalence rates for HIV, HBV, HCV, and syphilis were reported as 3.8%, 4.7%, 0.7%, and 1.3%, respectively. HIV and syphilis co-infection (19 cases, 38%) was found to be one of the most common combinations among those with co-infections [21].

There is a significantly high prevalence of syphilis among HIV-infected cases, especially among MSMs. The development of national guidelines for education programs for the screening, management, diagnosis, and treatment of HIV and syphilis is important for combating HIV and syphilis co-infection [22].

Our study confirms the importance of dual screening for sexually transmitted infections and highlights the epidemiological association between HIV and syphilis in Türkiye.

CONCLUSION

Considering the increasing coexistence of HIV and syphilis, patients presenting with any sexually transmitted disease should be screened for both infections. Raising awareness among healthcare professionals and ensuring appropriate counseling and follow-up are critical for preventing co-infection and improving patient outcomes.

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