

## Original Research Article

# Seroprevalence of syphilis in human immunodeficiency virus patients

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### ABSTRACT

**Background:** Syphilis is a sexually transmitted infection caused by, *Treponema pallidum*. Syphilis facilitates the transmission and acquisition of human immunodeficiency virus (HIV) and causes transient increase in the viral load. Sexually transmitted infections (STI) are 3-5 times more likely to acquire HIV infection, if exposed to the virus through sexual contact. Aim of the study was to estimate the seroprevalence of Syphilis in HIV patients.

**Methods:** A total of 920 blood samples were collected from HIV patients attending ART (Antiretroviral therapy) centre and were tested for Syphilis by using Rapid Plasma Reagin (RPR) and *Treponema pallidum* Hemagglutination Assay (TPHA). A total of 100 HIV non-reactive individuals were taken as a control group.

**Results:** Out of 920 samples, 102 (11.1%) were positive for Syphilis. Out of 102 Syphilis seropositive patients, males (76.5%) were more commonly affected in age group of 21-40 years. Both RPR and TPHA were reactive in 46% of cases and only TPHA reactive in 53.9% of cases. Out of 100 HIV non-reactive patients, 5% of patients are reactive for Syphilis.

**Conclusions:** In the present study, prevalence of Syphilis was more in HIV patients compared to HIV non-reactive persons. Persons with HIV infection acquired through sexual route should be screened for Syphilis by one nonspecific test along with specific test to confirm the diagnosis. This will help in proper management of the patients having Syphilis and HIV co-infection.

**Keywords:** HIV, RPR, Syphilis, TPHA

## INTRODUCTION

Syphilis is a sexually transmitted infection caused by a spirochete bacterium, *Treponema pallidum* which affects 12 million people each year worldwide.<sup>1,2</sup> In India, Syphilis and Chancroid were the main causes of sexually transmitted infection in 1970s and early 1980s. In late 1980s, the pattern of sexually transmitted infection has been shifted from bacterial to viral after identification of Human Immunodeficiency virus (HIV) infection.

Epidemiological studies demonstrate that STIs (Sexually transmitted infections), including Syphilis are associated

with an increased risk for HIV infection among both homosexual and heterosexual persons.<sup>3,4</sup> Furthermore syphilitic ulcers facilitate the transmission of HIV and causes transient increase in the viral load.<sup>5</sup> Studies demonstrated that individuals with sexually transmitted infections (STI) are 3-5 times more likely to acquire HIV infection, if exposed to the virus through sexual contact.<sup>6,7</sup>

*Treponema pallidum* cannot be cultivated in vitro and thus the diagnosis is dependent on clinical signs, direct demonstration of bacilli by Dark ground microscope, Polymerase chain reaction (PCR) and detection of

antibodies by serology.<sup>8</sup> Serological tests includes: nonspecific tests like venereal disease research laboratory (VDRL), rapid plasma reagin test (RPR) and specific tests like treponema pallidum immobilization test (TPI), fluorescent treponemal antibody absorption test (FTA-ABS) and treponema pallidum hemagglutination assay (TPHA).

In HIV infected patients, diagnosis of Syphilis may be more difficult. Atypical clinical presentations of Syphilis are common among HIV patients and unusual serological responses like high titers and false negative reactions have been reported with nonspecific tests (VDRL). Therefore, specific tests like TPHA or FTA-ABS should always be done in all HIV reactive patients.<sup>9</sup>

## METHODS

A prospective study was conducted in the department of Microbiology, Andhra medical college, Visakhapatnam for a period of 3 months from August 2017 to October 2017. A total of 920 blood samples were collected from HIV patients attending ART (Antiretroviral therapy) centre and were tested for Syphilis by using Rapid Plasma Reagin (RPR) test and Treponema pallidum Haemagglutination Assay (TPHA). A total of 100 HIV non-reactive individuals were taken as a control group.

### Inclusion criteria

- Patients with HIV infection acquired through sexual route.
- Age between 20-80 years
- Patients who gave a valid consent

### Exclusion criteria

- Patients with HIV infection acquired through other routes
- Age <20 and >80 years
- Patients who are not willing to give a valid consent

### Sample collection

A 3 ml-5 ml venous blood specimen was collected from each patient into a plain vacutainer under sterile aseptic conditions, allowed to clot for about 10-15 minutes or centrifuged at 3000 rpm for 5 minutes

### Processing of samples

Samples were tested for Syphilis by using rapid card test (RPR) and Rapid kit test (TPHA) as per the guidelines and instructions and protocol given in the kit insert.

### RPR (Reckon Diagnostic Pvt. Ltd.)

The RPR test was performed qualitatively for all samples and quantitatively only for titration of reactive samples.

A standard RPR test with 18 mm circle card (Reckon Diagnostics) was carried out, by mixing one drop of serum with one drop of RPR reagent, on a shaker for 8 minutes, and results read in good light. A Reactive sample is indicated by macroscopically visible black clumps against white background on card whereas non-reactive samples appear to have smooth uniform light gray colour. Results were recorded as positive and negative with respect to positive and negative control sera which were included in each test run.

### TPHA (Oscar Medicare Pvt. Ltd)

TPHA test was performed qualitatively by adding 2-3 drops of serum to the sample well using provided disposable sample dropper. Results were noted within 5-15 minutes. Results were recorded as positive, if there were two colored bands one at test region and another at control line region and negative if there was only one colour band at control line region. Sensitivity of TPHA is 99.9% and specificity is 99.5%.

## RESULTS

A total of 920 blood samples were collected from HIV patients attending ART centre and were tested for Syphilis by using Rapid Plasma Reagin (RPR) test and Treponema pallidum Hemagglutination Assay (TPHA). Out of 920 total HIV reactive samples, 102 (11.1%) were positive for Syphilis and 818 (88.9%) were seronegative (Table 1).

**Table 1: Seropositivity of Syphilis among total HIV reactive samples (no-920).**

Total samples	Seropositivity for syphilis	Seronegative for syphilis
920	102 (11.1%)	818 (88.9%)

Out of the 102 seropositive cases a higher seropositive case a higher seroprevalence was observed in Males (76.5%) than females (23.5%), suggesting males were more commonly affected than females (Table 2).

**Table 2: Sex wise distribution of Syphilis seropositive patients (no-102).**

Total no (%)	Males (%)	Females (%)
102 (100%)	78 (76.5%)	24(23.5%)

56.8% of patients were from the age group 21- 40 years, 26.5% were from 41-60 years and 16.7% were from 61-80 years in the present study. It was evident that 21-40 years was the most commonly affected age group followed by 41-60 years (Table 3).

Out of 102 cases, both RPR and TPHA were reactive in 46.1% of cases and only TPHA reactive in 53.9% of cases (Table 4).

Out of 47 RPR positive cases, 28 showed titer >1:8, and 19 cases showed titers <1:8 (Table 5).

A control group of 100 HIV non-reactive samples were tested for syphilis serology of which 5 were seropositive i.e., 5% and 95% were seronegative (Table 6).

**Table 3: Age wise distribution of Syphilis seropositive patients (no-102).**

Age in years	Total no (%)
21-40 years	58 (56.8%)
41-60 years	27 (26.5%)
61-80 years	17 (16.7%)

**Table 4: Correlation of RPR and TPHA among HIV-positive patients (no-102).**

RPR	TPHA	Patients reactive
Reactive	Reactive	47 (46.1%)
Non-reactive	Reactive	55 (53.9%)
Reactive	Non-reactive	Nil
RPR	TPHA	Patients reactive
Reactive	Reactive	47 (46.1%)

**Table 5: RPR (Quantitative test) (no-47).**

RPR positive samples no	Titre
28	>1:8
19	<1:8

**Table 6: Seropositivity for Syphilis in control group (HIV non-reactive) (no -100).**

Total no. (%)	Reactive (%)	Non-reactive (%)
100	5 (5%)	95 (95%)

## DISCUSSION

Syphilis facilitates transmission and acquisition of HIV. The two sexually transmitted diseases are of major public health concern. Further Syphilis has negative impact on HIV infection resulting in increasing viral loads and decreasing CD4 cell counts during Syphilis infection. Likewise, HIV has an impact on the clinical course of Syphilis. Patients with concurrent HIV are thought to be at increased risk of neurological complications (Neuro syphilis) and treatment failure.<sup>10,11</sup> Hence prompt diagnosis of Syphilis in HIV patients is extremely important.<sup>12,13</sup> In HIV patients, there are altered clinical manifestations and serological response in syphilis. Hence serological tests for Syphilis may be difficult to interpret in HIV reactive patients because of atypical responses such as delayed responses to both Treponemal and Non Treponemal tests. Nonspecific tests like RPR/VDRL are less likely to identify Syphilis except in primary stage of disease, where TPHA may appear non-reactive. More ever, nonspecific tests produce more false positive results at all stages and more false negative

results in late disease. Hence TPHA positive/VDRL or RPR negative implies that patient has Treponemal infection.<sup>7</sup>

In the present study, seropositivity for Syphilis in HIV reactive patients was 11.1% which coincides with the studies of Shweta Sharma et al (11.4%) and Ray K et al, (8.8%).<sup>14,15</sup>

Out of 102 Syphilis seropositive patients in our study, males (76.5%) were more commonly affected than females, which correlates with the studies of Shweta et al (76.3%)<sup>14</sup> and Kiran Bala et al, (75%)<sup>16</sup> where females were predominantly affected in study from Ethiopia (Eticha et al, 2013).<sup>16,17</sup>

More commonly affected age group in our study was 21-40 years (56.8%) followed by 40-60 years because it is the most sexually active age group which in accordance with Shweta Sharma et al (53.6%).<sup>14</sup>

In our study, both RPR and TPHA were reactive in 46% of cases, where Murawala et al, reported in 62.16% and SP Dumre et al, reported in 35.7% of cases.<sup>18,19</sup> Patients whose sera give positive results to both the TPHA and RPR tests are very likely to have been infected by Treponemes at some time in their life.

RPR non-reactive and TPHA positive result seen in 53.9% of cases in the present study, where Turbadkar D et al, reported in 47 % of cases.<sup>20</sup> Such TPHA positive and RPR negative results were found as treated Syphilis and some as late Syphilis cases, which indicates more specificity of TPHA test. TPHA is found to be superior for the diagnosis of Syphilis over RPR/VDRL as observed in our study and consistent with Young H et al.<sup>21</sup> In the present study, 5% seropositivity for Syphilis was reported in Control group (HIV non-reactive) where Kiran Bala et al, 16 reported 2.8% of seropositivity in control group.

## CONCLUSION

In the present study, prevalence of Syphilis was more (about 2.2 times) in HIV sero reactive persons as compared to non-reactive persons. Males were predominantly affected with Syphilis in HIV reactive persons and most commonly affected age group was 21-40 years. It was recommended that, all the patients with HIV infection acquired through sexual route should be screened for Syphilis by one nonspecific test along with specific test to confirm the diagnosis Similarly Persons with newly diagnosed Syphilis should be counselled for HIV testing. This will help in proper management of the patients having Syphilis and HIV coinfection.

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## REFERENCES

- Botham SJ, Ressler KA, Bourne C, Ferson MJ. Epidemic infectious syphilis in inner Sydney—strengthening enhanced surveillance. *Aus N Z J Public Health.* 2006;30(6):529-33.
- Global prevalence and incidence of selected curable sexually transmitted infections: overview and estimates, 2001. Available at: [https://www.who.int/reproductivehealth/publications/rtis/HIV\\_AIDS\\_2001\\_2/en/](https://www.who.int/reproductivehealth/publications/rtis/HIV_AIDS_2001_2/en/) . Accessed 28 May 2019.
- Darrow WW, Echenberg DF, Jaffe HW, O'Malley PM, Byers RH, Getchell JP, et al. Risk factors for human immunodeficiency virus (HIV) infections in homosexual men. *Am J Public Health.* 1987;77(4):479-83.
- Risk factors for AIDS among Haitians residing in the United States. Evidence of heterosexual transmission. The Collaborative Study Group of AIDS in Haitian-Americans. *JAMA.* 1987 Feb 6;257(5):635-9.
- HIV InSite. Syphilis and HIV. 2006. Available at <http://hivinsite.ucsf.edu/InSite?page=kb-05-01-04>. Accessed 28 May 2019
- Rolfs RT, Joesoef MR, Hendershot EF, Rompalo AM, Augenbraun MH, Chiu M, Bolan G, et al. A randomized trial of enhanced therapy for early syphilis in patients with and without human immunodeficiency virus infection. *N Engl J Med.* 1997;337(5):307-14.
- Royce RA, Sena A, Cates Jr W, Cohen MS. Sexual transmission of HIV. *N Engl J Med.* 1997;336(15):1072-8.
- Tsang RS, Martin IE, Lau A, Sawatzky P. Serological diagnosis of syphilis: comparison of the Trep-Chek IgG enzyme immunoassay with other screening and confirmatory tests. *FEMS Immunol Med Microbiol.* 2007;51(1):118-24.
- Löwhagen GB. Syphilis: test procedures and therapeutic strategies. *Seminars Dermatol.* 1990;9(2):152-9.
- Salado-Rasmussen K. Syphilis and HIV co-infection. Epidemiology, treatment and molecular typing of *Treponema pallidum*. *Dan Med J.* 2015 1;62(12):B5176.
- Gordon SM, Eaton ME, George R, Larsen S, Lukehart SA, Kuypers J, et al. The response of symptomatic neurosyphilis to high-dose intravenous penicillin G in patients with human immunodeficiency virus infection. *N Engl J Med.* 1994;331(22):1469-73.
- Kofoed K, Gerstoft J, Mathiesen LR, Benfield T. Syphilis and human immunodeficiency virus (HIV)-1 coinfection: influence on CD4 T-cell count, HIV-1 viral load, and treatment response. *Sexually Transmitted Dis.* 2006;33(3):143-8.
- Gitaí LL, Jaláli PS, Takayanagui OM. Neurosyphilis in the age of AIDS: clinical and laboratory features. *Neurological Sci.* 2009;30(6):465.
- Sharma S, Chaudhary J, Hans C. VDRL v/s TPHA for diagnosis of syphilis among HIV sero-reactive patients in a tertiary care hospital. *Int J Curr Microbiol App Sci.* 2014;3(5):726-30.
- Ray K, Bala M, Gupta SM, Khunger N, Puri P, Muralidhar S, et al. Changing trends in sexually transmitted infections at a Regional STD Centre in north India. *Indian J Med Res.* 2006;124(5):559-68.
- Bala K, Chaudhary U, Gill PS, Mittal S, Vohra P. Seroprevalence of syphilis in HIV patients. *Int J Pharm Med Bio Sci.* 2013;2(1):38-44.
- Eticha BT, Sisay Z, Alemayehu A. Seroprevalence of syphilis among HIV-infected individuals in Addis Ababa, Ethiopia: a hospital based cross-sectional study. *BMJ Open.* 2013;3:e002293.
- Murawala SM, Vegad MM, Chudasama VC, Priyadarshini G, Gandhi PV. Seroprevalence and comparative study of diagnostic tests in syphilis in tertiary care teaching hospital, Western India. *J Res Med Den Sci.* 2015;3(3):199-203.
- Dumre SP, Shakya G, Acharya D, Malla S, Adhikari N. Diagnostic dilemma of the single screening test used in the diagnosis of Syphilis in Nepal. *Nepal Med Coll J.* 2011;13(4):238-40.
- Turbadkar D, Mathur M, Gaikwad S. Prevalence of Syphilis among HIV-seroreactive Patients. *Indian J Sexually Transmitted Dis AIDS.* 2007;28(2):91-3.
- Young H, Henrichsen C. *Treponema pallidum* haemagglutination test as a screening procedure for the diagnosis of Syphilis. *Brit J Venerol Dis.* 1974;50(5):341-6.

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