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# SEROPREVALENCE OF SYPHILIS AND CO-INFECTIONS WITH HEPATITIS B VIRUS, HEPATITIS C VIRUS AND HIV IN A TERTIARY CARE HOSPITAL IN MUMBAI

Microbiology

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## ABSTRACT

Syphilis does not only affect the individual but is also a public health problem. It also increases risk of HIV infection and can cause lifelong morbidity among children born to infected mothers. High risk behaviour like multiple sex partners and unsafe injection practices not only increases chances of acquiring HIV but increase the risk for HBV and HCV transmission. This study was undertaken to study the seroprevalence of Syphilis and co-infection with HIV, HBV and HCV in a tertiary care hospital of Mumbai.

**Material and Methods:**

A total of 4160 blood samples received in the Regional STI Training, Research and Reference Laboratory, Department of Microbiology, Mumbai from patients attending the Suraksha clinic, referrals from high risk cases from peripheral hospitals, various STI clinics and ART patients were received from January to December 2016. Syphilis testing was performed using VDRL antigen from Institute of Serology, Kolkata. All the sera reactive in qualitative and quantitative VDRL test were confirmed for antitreponemal antibodies by TPHA test. Biological false positives (BFP) estimated Testing for HIV was done as per National guidelines. Hepatitis B surface Antigen and Hepatitis C virus antibody testing were done using ELISA methods.

**Results:**

The seroprevalence of Syphilis in our study was 3% with BFP of 0.7 %. HIV, HBV and HCV seropositivity in the study was 6.63%, 3.36% and 1.73% respectively. The co-infection rate of HIV, HBV and HCV with Syphilis in the study was 0.21%, 0.16% and 0.07% respectively. Co-infection of HBV and HCV with HIV was 0.28% and 0.26% respectively. HBV and HCV co-infection was 0.04%.

**Conclusion:**

Public health interventions should be carried out to promote awareness of syphilis among physicians and populations at risk in India. The increased risk of acquiring HBV, HCV and HIV in STI clinic attendees warrants screening the high-risk population for these viral infections.

## KEYWORDS

Syphilis, HIV, HBV, HCV co-infections

## INTRODUCTION

Sexually transmitted infections (STIs) are some of the most common causes of morbidity worldwide. Incidence of STIs, in the world, is rising despite improved methods of diagnosis and treatment. There are 333 million new cases of STIs per year in the world in which HIV is not included. They are far more common in developing countries.[1]

Syphilis caused by Treponema pallidum remains an important cause of morbidity in India and is also associated with other ulcerative sexually transmitted infections. The disease does not only affect the individual but is also a public health problem. It also increases risk of HIV infection and can cause lifelong morbidity in children born to infected mothers. 2 High risk behaviours such as multiple sexual partners and intravenous drug abuse not only causes transmission of HIV but also other blood borne viruses such as HBV and HCV. [3]

Various studies throughout India have shown different seroprevalence rates in different socio economic groups of India. Hence this study was undertaken to study the seroprevalence of Syphilis and co-infection of HIV, HBV and HCV in a tertiary care hospital of Mumbai which is the Regional STI Training, Research and Reference Laboratory.

## MATERIAL AND METHOD:

A total of 4160 Blood samples received in the Regional STI Training, Research and Reference Laboratory (RSTRRL), Department of Microbiology, Mumbai were processed from January to December 2016. The regional centre receives samples from male and female patients attending the Suraksha clinic (RTI/ STI OPD's in Gynaecology and Skin Department) in the hospital, referrals from high risk cases from peripheral hospital, various STI clinics and ART (Anti retroviral therapy) patients. Approximately, 10ml of venous blood was collected from each patient.

The testing strategy employed for the diagnosis of syphilis in this centre is as per the recommendation of WHO and National AIDS Control Organisation (NACO) i.e. a reagin or non-treponemal test such as Venereal Disease Research Laboratory (VDRL) test used for screening followed by a treponemal test Treponema pallidum hemagglutination (TPHA) test for confirmation in VDRL reactive cases.4 All the serum samples were screened for cardiolipin antibodies by the VDRL test. VDRL test was carried out using VDRL antigen from Institute of Serology, Kolkata. VDRL reactive specimens were subjected to quantitative VDRL test with successive two fold dilutions of the serum in 0.9% saline. All the sera reactive in qualitative VDRL test were confirmed for antitreponemal antibodies by TPHA test (IMMUTREP TPHA, Omega Diagnostics). VDRL and TPHA tests were performed according to standard procedures following manufacturer's instructions.

## INTERPRETATION OF VDRL RESULTS

VDRL reactive sera were divided into two categories, one having titre <1:8 and other one with titre ≥1:8 for evaluation of TPHA results. A Biological false positive (BFP) was considered when the combination of a reactive reagin, or non-treponemal, test and a nonreactive treponemal test result was obtained (VDRL positive but TPHA negative).

Testing for HIV was done as per National guidelines. Serum samples were tested by ELISA for Hepatitis B virus surface antigen (HBsAg) by (Hepalisa, J. Mitra &Co. Pvt Ltd) and anti- HCV antibodies (SD HCV ELISA 3.0).

## RESULTS:

A total of 4160 blood samples were received in the laboratory from January to December 2016. Of these samples 2120 samples were from males, 2031 were from females and 9 samples were from transgenders. Maximum samples that were received were in the age group of 25- 44 years. The age wise distribution of samples is as follows (Table 1)

**Table 1**

| < 19 years | | | 20-24 Years | | | 25-44 years | | | 45 and above | | | Total | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| M | F | TG | M | F | TG | M | F | TG | M | F | TG | M | F | TG |
| 95 | 76 | 0 | 342 | 193 | 3 | 1131 | 1439 | 5 | 552 | 323 | 1 | 2120 | 2031 | 9 |
| Total | 4160 | | | | | | | | | | | | | |

— Males; F- Females; TG- Transgenders
The results for VDRL testing and TPHA testing is given in Table 2

**Table 2**

| Sr No | VDRL and TPHA results | Number Positive | Percentage |
|---|---|---|---|
| 1 | VDRL positive < 1:8, TPHA positive | 77 | 1.8% |
| 2 | VDRL positive >= 1:8,TPHA positive | 49 | 1.17% |
| 3 | Total VDRL positive , TPHA positive (1+2) | 126 | 3% |
| 4 | VDRL positive, TPHA negative (BFP) | 30 | 0.7% |

VDRL positive in males was 68, in females were 57 and in TG's it was 1. VDRL>= 1:8 was seen in 23 males, 32 females and 1 TG. All BFP had titre less than 1:8.

The results of HIV, HBV and HCV testing were as follows: Table 3

**Table 3**

| Sr No | Test | Number Positive | Percentage |
|---|---|---|---|
| 1 | HIV | 276 | 6.63% |
| 2 | HBsAg ELISA | 140 | 3.36% |
| 3 | HCV Antibody ELISA | 72 | 1.73% |

The following co-infections were found in the 4160 samples tested. (Table 4)

**Table 4**

| Sr No | Co-infections | Number Positive | Percentage |
|---|---|---|---|
| 1 | HIV and VDRL positive | 9 | 0.21% |
| 2 | HBV and VDRL positive | 7 | 0.16% |
| 3 | HCV and VDRL positive | 3 | 0.07% |
| 4 | HBV and HIV positive | 12 | 0.28% |
| 5 | HCV and HIV positive | 11 | 0.26% |
| 6 | HBV and HCV positive | 2 | 0.04% |

## DISCUSSION:

Syphilis was successfully controlled by effective public health measures due to the availability of a sound diagnostic test and effective and economical treatment options. But due to the advent of HIV pandemic the number of Syphilis cases has increased. Due to multiple sexual partners and unsafe injection practices in intravenous drug abuse not only HIV but other viral STI's like HBV and HCV are also on a rise. Different studies in India have given different seroprevalence rates of these infections in different socio economic groups. Hence this study was planned to estimate the seroprevalence of Syphilis and co-infection of HIV, HBV and HCV in a tertiary care hospital of Mumbai which is the Regional STI Training, Research and Reference Laboratory.

In our study 4160 samples were received in the laboratory from January 2016 to December 2016 for testing. Maximum patients were in the age group of 25 – 44 years (61.89%). The number of males (n=2120, 50.96%) were more then the females (n=2031, 48.82%). A similar finding was seen in a study done by Bala M et al [5] and Tankhiwale et al 6 were the maximum patients tested in the STI clinic group were in the age group of 25-44 years which is the reproductive age group and males were more than the number of females tested.

The seroprevalence of VDRL and TPHA positive was 3% (n=126) in our study. The prevalence in males was 1.63% (n=68) whereas in females it was 1.37% (n=57) and in TGs it was 0.02% (n=1). Only 0.7% (n=30) were BFP. In the study done by Bala M et al 5 the overall seroprevalence of Syphilis was 1.4% but in STD clinic attendees it was found to be 3.5% and BFP was found to be 0.2%. In the study done by Tankhiwale S et al [6] overall seroprevalence was less at 0.7% with nearly equal percentage of males and females positive (0.34% and 0.35% respectively) but prevalence in STD clinic attendees was 1.35%. In their study BFP was 0.47%. A study done by Sethi et al [7] to study the trend of Syphilis over the years the prevalence was found to range from 0.95% to 1.79%, BFP in their study was 0.27%. As most of the patients included in our study were from RTI/STI outpatients in our hospital which caters to high risk groups, STI clinics and referrals from peripheral hospitals the seroprevalence of syphilis matches the other studies. The prevalence of BFP was nearly the same in other studies so it can be said that a confirmatory test such as TPHA should be performed on all sera with a reactive VDRL regardless of its titre as has been concluded by Bala M et al [5].

HIV seropositivity was observed in 6.63% of the patients (n=276). 3.36% (n=140) were HBsAg ELISA positive and 1.73% (n=72) were HCV ELISA positive. The study done by Hussain et al [3] for the prevalence of HIV, HBV and HCV in STD clinic in north India was 2.4%, 2.9% and 1% respectively. In a study by Tankhiwale et al [8] in the western region the prevalence of HIV, HBV and HCV was found to be 7.55%, 14.38% and 3.23% respectively. A higher prevalence of the viral STIs was seen in the study by Tankhiwale et al [8] as compared to our study; whereas in the study by Hussain et al [3] HBV and HCV prevalence is comparable but HIV seropositivity is higher in our study. The co-infection rate of HIV, HBV and HCV with Syphilis in this study was 0.21% (n=9), 0.16% (n=7) and 0.07% (n=3) respectively; however co-infection of HBV and HCV with HIV was 0.28% (n=12) and 0.26% (n=11). HBV and HCV co-infection was 0.04% (n=2). There was no triple co-infection.

Hussain et al [3] study documented a co-infection rate of 0.1% for HIV and Syphilis which is less than our study whereas HBV and HIV and HBV and HCV co-infection was 0.2% and 0.1% respectively which is similar to our study. No other co-infection or triple infections were documented in this study. In the study by Tankhiwale et al [8] co-Infection of HBV and HCV with HIV was 1.43% and 0.71% respectively. HBV and HCV co-infection was 1.43%. Thereby showing a higher prevalence of viral STIs as compared to our study.

This variation in the seroprevalence and co-infections could be due to different socioeconomic groups in the regions, high risk behaviours and history of intravenous drug abuse leading to unsafe injection practices. Prevalence of co-infection indicates that the infections could be transmitted simultaneously due to their common modes of transmission such as sharing of needles or unsafe sexual transmission among such risk groups. Although the co-infection rates are less in the study they are a cause of concern. This suggests that HBV and HCV testing should be included in the diagnostic algorithm of testing in high risk group patients to know the burden of infections in the country along with testing for HIV and Syphilis. This will lead to prompt treatment and better outcome of the patients. In addition regular follow up of these patients with Gastroentorology department would enable monitoring disease progression.

## SUMMARY AND CONCLUSION:

We would like to conclude that public health interventions should be carried out to promote awareness of syphilis among physicians and populations at risk in India. This will avoid the adverse consequences which result from missed diagnosis or improper treatment. In addition to easy acquisition of HIV, untreated syphilis will also lead to latent stages of the disease and maternal to child transmission resulting in congenital syphilis.

The increased risk of HBV, HCV and HIV in STI clinic patients warrants screening the high-risk population for these viral infections. This would aid in early detection of co-infections and thereby lead to early treatment. This would facilitate limiting the spread of these blood-borne/ sexually transmitted infections. STI clinics even in the peripheral hospitals should support an approach of targeted screening of all these viral infections, integrating viral hepatitis testing, counselling and referral services into the existing STI prevention and treatment services.

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**Conflict of interest statement**

We declare that we have no conflict of interest.

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