

Sociodemography and seroprevalence of hepatitis B, hepatitis C and *Herpes Simplex* virus infections among RTI/STI clinic attendees from a tertiary care hospital in Mumbai

Mankiru Laloo^{1*}, Nishat Khan², Bhaduli Samal³, Jayanti Shastri⁴

Department of Microbiology, TNMC and BYL Nair and Ch. Hospital, Mumbai, 400008, Maharashtra, INDIA.

Email: laloomankiru12@gmail.com

Abstract

Sexually Transmitted Infections are the most common infectious diseases worldwide and they present a huge burden of disease and adversely impact reproductive health of people. Worldwide over 340 million new cases occurred each year. STIs including Human Immunodeficiency Virus (HIV) continue to present major health, leading to socio-economic problems and stigma. Among the various infections whose incidence has increased in the presence of HIV infection, Hepatitis B, Hepatitis C and Herpes simplex virus infection stand out clearly. This is so, because the routes of transmission of these diseases are the same as those of HIV. **Summary:** The seroprevalence of HBsAg is 3.2%, HCV antibody is 2.4% and HSV IgM 1 and 2 antibody is 3.6%. Prevalence of coinfections of HBV/HIV, HSV/HIV, HCV/HSV, HBV/HCV/HIV and HBV/HCV/HIV/Syphilis is 0.4% each and HIV/ Syphilis is 0.8%.

Key Words: Hepatitis B, Hepatitis C, *Herpes Simplex* Virus, RTI/STI clinic, Sociodemography, Seroprevalence.

*Address for Correspondence:

Dr. Mankiru Laloo, Department of Microbiology, TNMC and BYL Nair and Ch. Hospital, Mumbai, 400008, Maharashtra, INDIA.

Email: laloomankiru12@gmail.com

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INTRODUCTION

Sexually transmitted infections/reproductive tract infections (STI/RTI), continue worldwide to be a major public health problem especially in developing countries, despite all measures taken in syndromic management. RTI/STI cause serious health, economic and social consequences. According to WHO, 499 million people aged 15-49 years suffered from STIs throughout the world, of which 79 million cases occur in India annually.¹ In India, the prevalence of STI in the adult population is

about 6%.² Viral STIs are infectious even when symptoms are absent. Chronic infections with Hepatitis B virus, Hepatitis C virus, HIV are major public health problems, since they are responsible for AIDS (HIV) and cirrhosis of the liver and hepatocellular carcinoma (HBV and HCV). The aetiological pattern of genital ulcer diseases (GUD) is changing and *Herpes simplex* virus 2 is now the most common cause of genital ulceration among the STIs.³ Hepatitis B virus, Hepatitis C virus, *Herpes simplex* virus and HIV are the most common chronic infections documented worldwide. They have similar routes of transmission, namely through blood and blood products, sharing of needles to inject drugs and sexual activity, the most common being sexual route, enabling co-infection with these viruses a common event. The burden of these infections is immense. It is estimated that 350 million people have chronic HBV infection and at least one million people die annually from HBV-related liver disease, including cirrhosis and liver cancer.^[4] Likewise, an estimated of 180 million people have HCV infection worldwide.² Approximately, 140 million people were living with genital HSV-1 infection worldwide and

417 million people with genital HSV-2. Lastly, 36.7 million people were living with HIV.² Although the percentage of patients with co-infection is lower, the combination of viral infections such as HIV with HBV and HCV or HIV with Syphilis and HIV with HSV is a harmful dual brunt and may have a detrimental effect on treatment outcomes in patients on ART. Also, there is a 2-4 fold increased rate of HIV acquisition in the presence of genital ulcers.^[5] Therefore, an early diagnosis and treatment is a necessity. STI clinic patients are screened for HIV and syphilis; however, screening for other co-infections such as HBV, HCV and HSV is usually not included in the standard of care among HIV positive patients. The trends in incidence and risk factors for Hepatitis B and C and *Herpes Simplex* viruses are clearly changing over time and this is what prompted the following study, to find the seroprevalence of Hepatitis B virus, Hepatitis C virus and *Herpes simplex* virus infection in patients attending RTI/STI clinic in a Tertiary health care in Mumbai.

MATERIALS AND METHODS

An observational, descriptive, cross sectional study was conducted in the Department of Microbiology in a tertiary care hospital of Mumbai, India. Two hundred and fifty consecutive samples of the patients with STI/RTI related complaints attending the ICTC clinic of a tertiary care hospital in Mumbai were included as subjects. The inclusion criteria were patients in the age group 18 to 60 years and patients attending the ICTC (Integrated Counseling and Testing Centre) with RTI/STI related complaints were enrolled such as vaginal discharge, pelvic pain, low backache, lower abdominal pain, urethral discharge, penile ulcers, warts, scrotal pain and swelling. Patients below 18 years and above 60 years and unable and /or unlikely to comprehend and/or adherent to protocol were excluded from the study. Approximately, 10 mL of venous blood was collected from each patient and routine testing was done for VDRL and HIV as per National guidelines for RTI / STI control. Serum samples were tested by ELISA for Hepatitis B virus surface antigen (HBsAg) by (Merilisa HBsAg kit, manufactured by Meril Diagnostics Pvt. Ltd), anti- HCV antibodies (Merilisa HCV kit, manufactured by Meril Diagnostics Pvt. Ltd) and *Herpes simplex* virus type-1 and type-2 IgM ("Capture" ELISA Test for *Herpes simplex* Virus Type-1

and Type-2 IgM antibodies manufactured by DIA. PRO Diagnostics Bioprobes Srl).

RESULTS

The study included a total of 250 subjects, 54.4% ($n=136$) were male patients and 45.6% ($n=114$) were female patients. The average age of the study population was 34.39 ± 10.7 years. (Maximum age 60 years and minimum age 18 years). The average age of males was 35.21 ± 11.7 years with a range of 18- 60 years and that of females was 33.40 ± 9.3 years with a range of 18- 60 years.

Table 1: Socio demographic profile of the study population ($n=250$)

Variables	Numbers	Percentage (%)
Age group (yr)		
Less than 20 years	18	7.2
21-30	95	38.0
31-40	68	27.2
41-50	49	19.6
More than 50 years	20	8.0
Gender		
Male	136	54.4
Female	114	45.6
Education		
Illiterate	58	23.2
Primary school	98	39.2
Secondary school	30	12
College and above	64	25.6
Occupation		
Daily wages	85	34
Housewife	78	31.2
Business	37	14.8
Salaried	38	15.2
Student	12	4.8
Marital status		
Married	199	79.6
Single	38	15.2
Divorced	5	2.0
Widowed	8	3.2

Presenting complaint among male patients was pelvic pain followed by urethral discharge. Even in female patients the complaint of abdominal or pelvic pain was the most common presentation followed by vaginal discharge. The signs and symptoms of the patients at the time of presentation in RTI/STI OPD among males and females is shown in Figure 1 for males and Figure 2 for females.

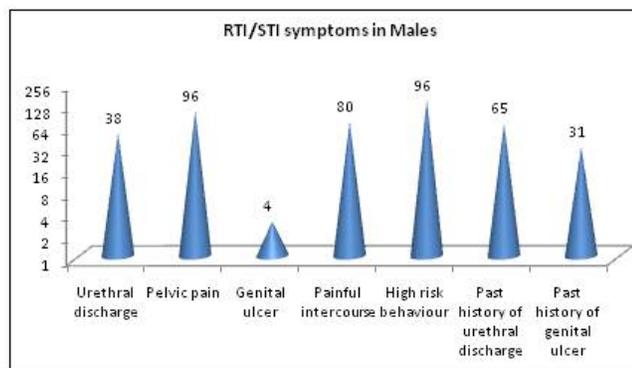


Figure 1: RTI/STI symptoms in males

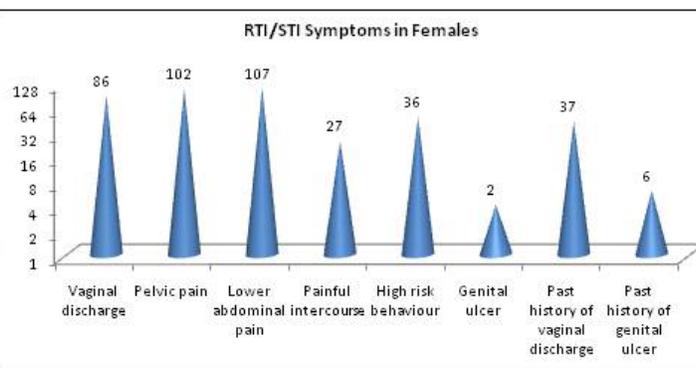


Figure 2: RTI/STI symptoms in Females

The seroprevalence of HBV, HCV, HSV, Syphilis and HIV in the study and the prevalence of co infections is shown in Tables 2 and Table 3 respectively.

Table 2: Seroprevalence of HBV, HCV, HSV, Syphilis and HIV in the study

Overall seroprevalence	Male (n=136)	Female (n=114)	Total (n=250)	P value
HBV	5	3	8 (3.2%)	0.915
HCV	5	1	6 (2.4%)	0.305
HSV I and 2 IgM	3	6	9 (3.6%)	0.341
Syphilis	7	1	8 (3.2%)	0.121
HIV	27	23	50 (20.0%)	0.924

Statistical comparison was determined by Chi-square with Yate's correction. Statistical significance was considered when $P < 0.05$

Table 3: Prevalence of co-infections of HBV, HCV, HSV, HIV and Syphilis in the study

Variables Overall seroprevalence	Total no. of males	Total no. of females	Total no. of positives	Total Percentage (n=250)	P value
HBV+HIV	1	0	1	0.4%	0.929
HSV+HIV	1	0	1	0.4%	0.929
HCV+HSV	1	0	1	0.4%	0.929
HBV+HCV+HIV	1	0	1	0.4%	0.929
HIV+VDRL	2	0	2	0.8%	0.557
HBV+HCV+HIV+VDRL	1	0	1	0.4%	0.929

Statistical comparison was determined by Chi-square with Yate's correction. Statistical significance was considered when $P < 0.05$. One patient each was seropositive for HBV and HIV, HSV and HIV, HCV and HSV, HBV, HCV and HIV and HBV, HCV and HIV, HBV, HCV, HIV and Syphilis. Two patients were seropositive for HIV and Syphilis. In our study, co-infection was seen only in male patients, no female patients had co-infection.

DISCUSSION

STIs remain a public health problem of major significance in most parts of the world. The prevalence of STIs is high in many countries including India. However, the exact figures are rarely available as various studies quote variable prevalence rates.² Most of the STIs, both ulcerative and non ulcerative, are prevalent in India and constitute one of the major public health problems. The profile of these infections varies in different parts of the country. Information regarding the profile of STIs relies essentially on syndromic diagnosis as laboratory infrastructure is not available at many places and hence etiological diagnosis is not possible.⁶ There has been a dramatic change in the epidemiological profile of STIs across the globe. This could be due to spread of HIV as an epidemic all over the world and also because of changing sexual practices. Viral infections are dominating the world today due to effective syndromic management of Bacterial STI's. Most STIs may present with genital lesions which are generally easy to identify and diagnose. But other STIs may not show any genital lesions making it rather difficult to diagnose.² HBV, HCV and HSV may enter the long carrier or latent stage during which they cannot be diagnosed clinically.² Failure to diagnose and treat viral STI's at an early stage may lead to serious complications and sequelae such as infertility, fetal wastage, ectopic pregnancy, liver cirrhosis, carcinoma and eventual death. Thus it becomes mandatory to have knowledge regarding their prevalence in the population.² Hence this study was carried out among 250 patients meeting the inclusion criteria. In the study, the majority of the subjects were in the sexually active age group of 21-30 years (38.0%), followed by 31-40 years (27.2%). Similarly, Sonali *et al.*² reported the prevalence of STI's as 44.1% in the age group of 20-29 years and Hussain *et al.*⁷ reported 57.93 % in the age group of 21-29 years. The male to female ratio in the present study was 1.19:1 which is almost similar to a study by Sonali *et al.*² which reported a male to female ratio of 1.29:1. In another study by Ganesh *et al.*⁸ the male to female ratio is 2.97:1 and

2.5:1 by Keramat *et al.*⁹ The study population consisted mostly of married clients with low level of education which correlated with another Indian study by Sonali *et al.*² and Manju Bala *et al.*¹⁰ In the present study, the most common complaint in males was pelvic pain followed by urethral discharge whereas females presented with lower abdominal pain or pelvic pain followed by vaginal discharge. In a study conducted by Baraman *et al.*¹¹ the most common symptom in males was found to be urethral discharge followed by scrotal swelling, then followed by genital ulcer and others while in females the most common symptom was vaginal discharge followed by lower abdominal pain followed by genital ulcer and others. Manju Bala *et al.*¹⁰ also reported vaginal discharge as the most common symptoms in females followed by abdominal pain and low backache. The seroprevalence of HBV was 3.2% in the present study which is similar to the previous studies of Suryanarayana *et al.* 3.52%⁴, Jindal *et al.* (3.7%)¹² and A.R. Anvikar *et al.* (3.4%)¹³. Studies carried out in STI patients in other parts of India have shown 8.82% in Maharashtra by Ganesh *et al.*⁸, 2.9% in North India by Hussain *et al.*⁷ and 25.9% in South India by Joyee *et al.*¹⁴ In the present study out of 5 male patients, 4 were married and 1 single. All were having multiple sexual partners. 4 were having exposure to commercial sex worker. 3 out of 5 patients had a past history of genital ulcer and 2 had a past history of urethral discharge. 3 patients are having urethral discharge at the time of presentation to the OPD. The positive rates of HBV were highest in the age group of 21-30 years. This corroborates with a study conducted by Suryanarayana *et al.*⁴ which showed a higher prevalence of HBV positivity among the subjects who are older than 18 years. This is compatible with the fact that sexual transmission is predominant route of transmission for HBV. We have noted higher prevalence rate was among males (5 males and 3 females) which is similar to a study conducted by Suryanarayana *et al.*⁴ owing to the fact that men frequently self report to the STD clinic. History of multiple sexual partner was obtained in the HBV seroprevalent males similar to the findings by Suryanarayana *et al.*⁴ The seroprevalence among RTI/STI patients for HCV antibody in the present study was 2.4% which is similar with the study conducted by Saravan *et al.* (2.2%).¹⁵ Chakaborty *et al.*¹⁶ reported a seropositivity of 1.5%, Sonali *et al.*² reported 0.45%· 0.2 % in Mangalore by Ronald *et al.*¹⁷. Higher seroprevalence for HCV antibodies was seen in studies conducted in JIPMER which showed a prevalence rate of 6% by Bhattacharya *et al.*¹⁸, 5.6 % in South India by Joyee *et al.*¹⁴ In the present study, the seroprevalence was high in males as compared to females which is similar to a study conducted by Chakaborty *et al.*¹⁶. The seroprevalence was

highest in the age group of 21-30 years (3 males and 1 female), followed by 1 male in the age group of 31-40 and 41-50 years respectively. Out of 6 patients, 5 were males and one female. Out of 5 positive male patients, 3 were married, 1 single and 1 separated. 3 patients were having exposure to commercial sex workers and all were having multiple sexual partners. 3 had a past history of urethral discharge, 3 also had a past history of genital ulcers and only one patient gave a history of urethral discharge at present. One patient was a known HIV positive. In the present study, the low frequency of HCV could be due to the low incidence of intravenous drug (IVD) users and no history of transfusion, which are relatively different from that reported from other parts of India where IVDs and transfusion history were the main risk factors identified for HCV infection. History of high risk behavior, multiple sexual partners and prior STI infections suggests that sexual intercourse could have been the route of infection. Though the role of sexual activity in the transmission of HCV remains unclear, NHANES III study showed that number of sexual partners had a significant correlation with HCV antibody and this has been confirmed in other studies by Alter *et al.*¹⁹ and Poynard *et al.*²⁰ The seroprevalence of HSV 1 and 2 IgM in our study was 3.6% (6 females and 3 males). This was low as compared to the study conducted by Aggarwal *et al.*²¹ where 17.6% and 15.66% by Tada *et al.*²² Seropositivity in the present study was highest in the age group of 21-30 years which is in concordance with the study conducted by Aggarwal *et al.*²¹ In the present study, 5 patients were in the age group of 21-30 years (3 males and 2 females), followed by 2 females in the age group of 31-40 years. There was only one female patient in the age group of 18-20 years. High seropositivity in this age group could be due to their sexually active life. Also adolescents are known to be at increased risk of acquiring STIs because of fewer protective antibodies and increased susceptibility of cervix.²¹ A combined testing of HSV IgM and IgG would enable us to understand the past infection with HSV too. Among 6 female patients, 2 were single and 4 were married. Only one was a female commercial sex worker. Out of the 6 patients, 2 had a past history of vaginal discharge and 1 had a past history of genital ulcer. 4 patients had complaints of vaginal discharge and only one patient gave a history of genital ulcer. 4 patients were having a history of high risk behavior. 2 patients out of the total 6 were having only history of vaginal discharge without any past history of genital ulcer. Majority of these female patients were illiterate. In our study, seropositivity was more common among illiterate patients as most women had little awareness of sexual and reproductive life and symptoms are generally ignored. Seroprevalence was also higher in

illiterate persons because of ignorance and in persons with multiple sexual partners because of high risk behavior. All 3 male patients were single and gave a history of high risk behavior. 2 patients had a past history of genital ulcers, one had a past history of urethral discharge and only one gave a history of urethral discharge. In the present study the seropositivity of HSV was high in females (2.4%) as compared to males (1.2%). This finding is similar to a study conducted by Tada *et al.*^[22] in which a higher seropositivity rate is high in females (25%) as compared to males (10%). Women could be more vulnerable to STIs as they have no choice for contraception methods, less opportunity for early diagnosis and treatment due to poor health seeking behavior.²¹ HSV infection predisposes to other STIs as it causes mucosal erosions and this increases the risk of other STIs²². The patients included in our study underwent HIV and VDRL testing as per the National guidelines for RTI / STI control program. On analysis of the case record forms the overall seroprevalence of HIV among the subjects in our study was 20.0% which is at par with the study by Devinder *et al.* 23.2%²³, Tungatkar *et al.* 23.52%²⁴ and Babu *et al.* 15.5%³⁴. In contrast to this study, a low prevalence has been reported by Khante *et al.* 0.79%²⁵, Sonali *et al.* 5.45%², 1.6% by Karkare *et al.*²⁶ and Hussain *et al.* 2.4%⁷. This variation may be due to the difference in awareness about STIs in different areas. In the present study, out of 50 patients, 27 were male patients and 23 female patients and maximum numbers of patients infected with HIV were in the age group of 31-40 years. This could be due to the more risky sex behavior practices in this age group. Overall seropositivity for syphilis in our study was 3.2% with males and females having seroprevalence of 2.8% and 0.4% respectively. This is in concordance with a study conducted in Nagpur by Gedam *et al.* 3.07%²⁷. Higher prevalence of syphilis in men as compared to women was seen in our study. Similar finding has been seen in a study conducted in Iran by Nasirian *et al.* (males 0.005% vs females 0.02%)²⁸ and Sonali *et al.* (males 9.67% vs females 2.08%)². Out of 8 positive patients, 3 males and 1 female were in the age group of 21-30 years, followed by 2 males in the age group of 31-40 years. History of multiple sexual partners was present in all these patients. The prevalence of Syphilis was more in the age group of 21-30 years which is the most sexually active group; a similar finding is seen in the study conducted by Gedam *et al.*²⁷ In our study, co-infection of HBV /HIV, HBV/HCV, HIV/syphilis was 0.4%, 0.4 % and 0.8% respectively, almost similar to another study conducted by Hussain *et al.* (HBV/HIV-0.1%), (HBV/HCV- 0.1%) and (HIV/syphilis-1.0%)^[7]. In addition to these, there was one co-infection of HBV/HCV/HIV/syphilis (0.4%), one with HCV/HSV

(0.4%) and one with HSV /HIV (0.4%). None were found to be co-infected with HCV/HIV, HBV/syphilis, or HCV/syphilis. All the co infections were seen in males, no females had any co infections. This finding is similar to a study conducted by Saravanan *et al.*¹⁵. Sonali *et al.*² reported a co-infection of HBV/HIV of 1.36% and HBV/HIV of 0.45% . In another study, co-infection of HBV/HIV reported as 2% by Rajesh *et al.*²⁹, 15.19% by Saha *et al.*³⁰. Keramat *et al.*⁹ reported co-infection of the viral infections in 4.5% (17 cases) including 13 cases of HIV and HCV infections, 3 cases of HCV and HBV and 1 case with HIV and HBV infections. Various studies on HIV/HSV IgM and/or IgG co-infections have shown very high prevalence rate of HSV. Rastogi *et al.*³¹ reported a co-infection of HSV IgM I and 2 /HIV of 42.9%. Saha *et al.*³⁰ reported HSV-2/HIV of 36.76%· HSV-2 IgG/HIV 59.79% by Nag *et al.*³² and HSV -2 IgG /HIV 87% by Agabi *et al.*³³. Although the percentage of patients with co-infection is lower, the combination of viral infections such as HIV and HBV or HBV and HCV or HIV and Syphilis and HIV and HSV would prove to be a double or triple whammy and may lead to rapid progression of HIV disease with poor treatment outcomes.⁷ HIV, HCV, and HBV may promote each other and be related to different cultures and living habits. Also HSV acts as a co factor in transmission of HIV as it reactivates the mucosal or epithelial disruption, creating a portal of exit or entry for HIV. The increased risk of HBV, HCV, HSV and HIV among STIs patients warrants specific preventive action such as Hepatitis B immunization in sex workers and in individuals indulging in multiple sex partners, screening for Hepatitis C and *Herpes simplex* virus and antiviral therapy for HSV. A timely diagnosis of these co-infections can minimize downstream adverse health effects, offset rapid disease progression, encourage cure and, most importantly, reduce transmission to partners and children. This will cumulatively decelerate co-infection epidemics.²

CONCLUSION

To conclude in our study, the seroprevalence of HBsAg is 3.2%, HCV antibody is 2.4% and HSV IgM 1 and 2 antibody is 3.6%. Prevalence of coinfections of HBV/HIV, HSV/HIV, HCV/HSV, HBV/HCV/HIV and HBV/HCV/HIV/Syphilis is 0.4% each and HIV/ Syphilis is 0.8%. Viral STIs are on the rise among STI clinic attendees due to occurrence of asymptomatic shedding, poor health seeking behavior and stigma. Co-infection of HBV, HCV and/or HSV with HIV complicates the clinical course, management and may also adversely affect therapy. We recommend that all STI clinic attendees should be screened for these sexually and parenterally transmissible infections for their prompt

treatment and prevention of sequelae. There is a need to support an approach of targeted screening of these infections, into the existing STI prevention and treatment services. This study will enable the policy planners to understand the burden of sexually transmitted infections in Mumbai and thereby plan appropriate strategies for prevention and control.

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