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Comparison of clinical profile and demography of sexually transmitted infections (STIs) among patients attending an STI clinic in the pre-coronavirus disease-2019 (COVID-19), COVID-19, and post-COVID-19 era: A retrospective data analysis

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ABSTRACT

Objectives: The objectives of this study were to compare between the clinical profile and demography of patients with sexually transmitted infections (STIs) who attended the STI clinic of our tertiary care institution during comparable timelines in pre-coronavirus disease-2019 (COVID-19) (2018 June–2019 May) and COVID-19 (2020 June–2021 May) periods and between pre-COVID-19 and post-COVID-19 (2022 June–2023 May) periods.

Materials and Methods: Using a pre-set pro forma, we collected data on the demography and clinical profile of patients with STIs who attended our STI clinic during comparable timelines during pre-COVID-19, COVID-19, and post-COVID-19 periods.

Results: In comparison to the pre-COVID-19 period, a significant decline and a significant rise were noted in the total number of STI cases during the COVID-19 period and post-COVID-19 period, respectively. Compared to the pre-COVID-19 period, post-COVID-19 period witnessed an increase in the actual number of all STIs, except condylomata acuminata.

Limitations: Data from a single center and retrospective design were the major limitations.

Conclusion: We observed a post-COVID-19 surge in the number of STIs. The pattern of STIs in the post-pandemic era assumes importance in planning future strategies.

Keywords: Coronavirus disease-2019, Pre-coronavirus disease-2019, Post-coronavirus disease-2019, Sexually transmitted infection

INTRODUCTION

Sexually transmitted infections (STIs) include diseases that are usually acquired and transmitted through sexual activity.[1] STIs are important as a public health problem due to their potential to affect reproductive health.[2] Delay in seeking treatment for STIs is associated with increased severity and complications.[3]

A disruption in healthcare services was noted worldwide during the coronavirus disease-2019 (COVID-19) pandemic.[4-7] Patients were advised to avoid visits to healthcare facilities that catered

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to COVID-19 patients as far as possible, to reduce the risk of disease transmission. Many STI clinics are attached to tertiary referral centers, the majority of which was entrusted with the responsibility of treating critically ill COVID-19 patients. Moreover, restrictions imposed on travel to prevent the spread of COVID-19 had placed obstacles in reaching healthcare facilities situated away from one's residence. Due to the stigma and secrecy associated with STIs, the affected often prefer to seek treatment from healthcare facilities away from their homes. Hence, it is possible that many patients with STIs were not able to receive adequate treatment during the pandemic.

Available reports suggest that several patients with tuberculosis and leprosy were unable to receive standard care during the pandemic.[4,5] Centers for Disease Control and Prevention (CDC) reported underreporting of STIs during the COVID-19 pandemic and suggested that this might have led to inadequate treatment and spread of STIs.[8] CDC warned that the ill effects of the pandemic on STI control measures may persist for a long time.[8]

In this setting, we aimed to do a retrospective data analysis comparing the demography and clinical profile of patients with STIs who were evaluated in our STI clinic during comparable timelines in the pre-COVID-19 (2018 June–2019 May) and COVID-19 (2020 June–2021 May) periods and pre-COVID-19 and post-COVID-19 periods (2022 June–2023 May).[9,10]

MATERIALS AND METHODS

After obtaining clearance from the Ethics and Research Committees of our institution, we reviewed the case records of patients who received a diagnosis of STI from the STI clinic attached to the dermatology department of our tertiary referral center from June 2018 to May 2019, June 2020 to May 2021, and June 2022 to May 2023.

Patients who presented with diseases such as vulvovaginal candidiasis, bacterial vaginosis, and genital molluscum contagiosum were excluded from the study. We also excluded patients manifesting flat/papular/keratotic genital warts if they had similar lesions on other body areas as well. Case records with incomplete data were also excluded from the study.

We used a pre-set pro forma to collect data from the case records on demography, sexual behavior, previous history of STIs and substance abuse. Clinical findings and the laboratory investigation results were documented. As per institutional policy, all patients suspected to have STI were advised to undergo serology testing for human immunodeficiency virus (HIV) infection and hepatitis B and C infections, and rapid plasma regain test (RPR) for syphilis. Those found positive on RPR were tested by treponema pallidum hemagglutination assay for confirmation.

Details of Tzanck smear, gram stain, tissue smear, and dark ground microscopy analysis were noted in patients who presented with genital ulcers. In patients with urethral/vaginal discharge, results of Gram stain, saline smear study, and potassium hydroxide mount of the discharge were noted. A patient with urethral or vaginal discharge received a diagnosis of gonococcal infection when Gram stain revealed reniform, Gram-negative and intracellular diplococci within neutrophils. A diagnosis of non-gonococcal infection was made when urethral or vaginal discharge showed ≥ 2 white cells per oil immersion filed on Gram stain but failed to show Gram-negative intracellular diplococci.[1] A culture report of discharge on chocolate agar, whenever available, was noted.

Patients who had history, clinical features and serology diagnostic of primary/secondary/gummatous syphilis were classified accordingly.[1] Dark ground microscopy examination of lesional secretions was also relied on to arrive at a diagnosis of primary/secondary syphilis. Patients who had no clinical findings but had serology indicative of syphilis were classified into early latent syphilis (history of diagnosis of syphilis in person or partner within one year), late latent syphilis (history of diagnosis of syphilis in person or partner more than a year ago), and syphilis of unknown duration (unable to elicit history of syphilis in person or partner or patient could not recollect time interval between positive serology for syphilis in person and diagnosis of disease in person or partner). Neurosyphilis and cardiovascular syphilis were diagnosed as per CDC guidelines in consultation with respective specialists.[1]

Details of partner evaluation were collected.

Patients who attended the clinic from 2018 June to 2019 May, those who presented between 2020 June and 2021 May and those who presented from 2022 June to 2023 May were classified as patients belonging to the pre-COVID-19, COVID-19, and post-COVID-19 study periods, respectively.[9,10]

Data were entered in Microsoft Excel sheets and analyzed with Epi Info. The demography and clinical profile of patients in the COVID-19 and post-COVID-19 periods were separately compared with the same recorded in the pre-COVID-19 period to assess the impact of the COVID-19 pandemic on STIs. Categorical variables were expressed as numbers and percentages and compared by Pearson's Chi-square test. Continuous variables were expressed as mean and standard deviation and compared by ANOVA. $P < 0.05$ was considered significant.

RESULTS

During the 36-month study period (2018 June–2019 May, 2020 June–2021 May, and 2022 June–2023 May), 361 patients attended the STI clinic of our tertiary referral center. Out of the 361, 150 (41.6%) were men and 211 (58.4%) were women. The youngest and oldest were a newborn male baby with congenital syphilis and an 87-year-old man with syphilis of unknown duration, respectively (mean: 37.8 ± 14.5 years). Most of the patients were married (275/361, 76.2%), 71 (71/361, 19.7%)

were unmarried, and 15 (15/361, 4.2%) were divorced or separated. One hundred and eighty-two (182/361, 50.4%) patients had multiple partners at some point in time. Twenty-nine (29/361, 8%) patients showed homosexual orientation and 42 (42/361, 11.6%) had bisexual orientation. Evaluation of sex partners was possible in 156 patients (156/361, 43.2%). Thirty-five out of the 156 partners (22.4%) evaluated had STI at the time of evaluation. A past history of STI was documented in 6/156 (3.8%) partners evaluated.

The distribution of STIs among study participants is shown in Table 1.

Thirty-two patients (32/361, 8.9%) had multiple STIs. Table 2 shows the combination of STIs in these 32 patients.

The number of patients who attended the clinic during the pre-COVID-19, COVID-19, and post-COVID-19 periods were 119 (119/361, 33%), 55 (55/361 15.2%), and 187 (187/361, 51.8%), respectively. A significant difference was noted between pre-COVID-19 and COVID-19 ($P < 0.001$), COVID-19 and post-COVID-19 ($P < 0.001$), as well as pre-COVID-19 and post-COVID-19 periods ($P < 0.001$).

The mean age of the study participants who attended our STI clinic during pre-COVID-19, COVID-19, and post-COVID-19 periods was 35.7 ± 13 years, 36.8 ± 16 years, and 39.1 ± 14.8 years. The difference was not significant. The male-to-female ratio of study participants was 1.2:1 (66 men and 53 women), 1.04:1 (28 men and 27 women), and 0.4:1 (56 men and 131 women) during pre-COVID-19, COVID-19, and post-COVID-19 study periods, respectively. No significant difference was noted between the pre-COVID-19 and COVID-19 periods. However, a significant female predilection was noted in the post-COVID-19 period in comparison to pre-COVID-19 ($P < 0.001$) and COVID-19 periods ($P = 0.007$).

Number of patients with different STIs who sought treatment in our STI clinic during pre-COVID-19, COVID-19, and post-COVID-19 periods is depicted in Table 3.

There were no cases of congenital syphilis in the pre-COVID-19 period; however, one case each of congenital syphilis was diagnosed during the COVID-19 and post-COVID-19 periods. The number of early syphilis cases (primary/secondary/early latent) during pre-COVID-19, COVID-19, and post-COVID-19 periods was six (6/119, 5%), five (5/55, 9.1%), and 13 (13/187, 7%), respectively, and the difference was not significant.

Partner evaluation was possible for 51.3% (61/119), 49% (27/55), and 36.4% (68/187) patients during pre-COVID-19, COVID-19, and post-COVID-19 periods, respectively. No significant difference was noted between pre-COVID-19 and COVID-19 periods. However, a significant reduction was noted in partner evaluation during the post-COVID-19 period ($P = 0.01$) in comparison to the pre-COVID-19 period.

Table 1: Distribution of STIs in patients who attended the STI clinic of a tertiary referral center during the 36-month study period.

STI	Number (percentage of total) *n*=361 (100%)
Herpes genitalis	93 (25.8)
Condylomata acuminata	99 (27.4)
Syphilis	
Congenital syphilis	2 (0.6)
Chancre/secondary syphilis	21 (5.8)
Early latent syphilis	3 (0.8)
Late latent syphilis	1 (0.3)
Syphilis of unknown duration	119 (33)
Neurosyphilis	1 (0.3)
Cardiovascular syphilis	2 (0.6)
Total	149 (41.3)
HIV with STI	24 (6.6)
Gonococcal cervicitis/urethritis	6 (1.7)
Non-gonococcal cervicitis/urethritis	21 (5.8)
Trichomoniasis	2 (0.6)
Total bacterial STIs	172 (47.6)
Total viral STIs	208 (57.6)

STI: Sexually transmitted infection, COVID-19: Coronavirus disease-2019, HIV: Human immunodeficiency virus infection

Table 2: Diagnoses in study participants with multiple STIs.

Coexisting STIs	Number (percentage) *n*=32 (100%)
HIV and syphilis of unknown duration	9 (28.1)
HIV and chancre	2 (6.3)
HIV and secondary syphilis	1 (3.1)
HIV and late latent syphilis	1 (3.1)
HIV and herpes genitalis	7 (21.9)
HIV and non-gonococcal urethritis	1 (3.1)
HIV and condylomata acuminata	1 (3.1)
Herpes genitalis and syphilis of unknown duration	3 (9.4)
Herpes genitalis and condylomata acuminata	1 (3.1)
Condylomata acuminata and syphilis of unknown duration	2 (6.3)
Non-gonococcal urethritis and syphilis of unknown duration	1 (3.1)
Non-gonococcal urethritis and condylomata acuminata	1 (3.1)
Gonococcal urethritis and secondary syphilis	1 (3.1)
HIV, herpes genitalis, and syphilis of unknown duration	1 (3.1)

STI: Sexually transmitted infection; HIV: Human immunodeficiency virus infection

Table 3: STIs during the pre-COVID-19, COVID-19, and post-COVID-19 periods.

STI	Number of cases during a period of 1 year			Comparison
	Pre-COVID-19 period (June 2018–May 2019) *n*=119 (100%)	COVID-19 period (June 2020–May 2021) *n*=55 (100%)	Post-COVID-19 period (June 2022–May 2023) *n*=187 (100%)	
Herpes genitalis	39	11	43	Compared to pre-COVID-19 period, COVID-19 study period showed 71.8% reduction in number of cases and post-COVID-19 period showed 10.3% increase in number of cases.
Condylomata acuminata	43	19	37	Compared to pre-COVID-19 period, COVID-19 study period showed 55.8% reduction in number of cases and post-COVID-19 period showed 14% reduction in number of cases.
Congenital syphilis	0	1	1	There were no cases of congenital syphilis in pre-COVID-19 period, whereas one case each was detected during COVID-19 and post-COVID-19 periods.
Early syphilis (primary, secondary and early latent syphilis)	6	5	13	Compared to pre-COVID-19 period, COVID-19 study period showed 16.7% decrease in number of cases and post-COVID-19 period showed 116.7% increase in number of cases.
Syphilis of unknown duration	23	17	79	Compared to pre-COVID-19 period, COVID-19 study period showed 26.1% decrease in number of cases and post-COVID-19 period showed 243.5% increase in number of cases.
Total syphilis cases	31	24	94	Compared to pre-COVID-19 period, COVID-19 study period showed 22.6% decrease in number of cases and post-COVID-19 period showed 203.2% increase in number of cases.
Non-gonococcal urethritis	6	3	12	Compared to pre-COVID-19 period, COVID-19 study period showed 50% decrease in number of cases and post-COVID-19 period showed 100% increase in number of cases.
Gonococcal urethritis	2	0	4	Compared to pre-COVID-19 period, COVID-19 study period showed 100% decrease in number of cases and post-COVID-19 period showed 100% increase in cases.
Trichomoniasis	0	0	2	No cases were detected during pre-COVID-19 and COVID-19 periods and post-COVID-19 study period showed 2 cases.
STIs coexisting with HIV	4	3	16	Compared to pre-COVID-19 period, COVID-19 study period showed 25% reduction in number of cases and post-COVID-19 period showed 300% rise in number of cases.
Bacterial STIs	38	26	108	Compared to pre-COVID-19 period, COVID-19 study period showed 31.6% decrease in number of case and post-COVID-19 period showed 184.2% rise in number of cases.
Viral STIs	83	30	95	Compared to pre-COVID-19 period, COVID-19 study period showed 63.85% reduction in number of cases and post-COVID-19 period showed 14.5% rise in number of cases.

STI: Sexually transmitted infection, COVID-19: Coronavirus disease 2019

DISCUSSION

We divided the study period into pre-COVID-19, COVID-19, and post-COVID-19 periods. This was based on the travel restrictions imposed at the State Government level.[9,10] The Government of Kerala declared restrictions on travel and social gatherings to contain the spread of COVID-19 infection on March 17, 2020, which were completely lifted on February 28, 2022. The time period before March 17, 2020, was considered as pre-COVID-19 period, and the same after February 28, 2022, was considered as post-COVID-19 period.[9,10]

We excluded conditions such as bacterial vaginosis, vulvovaginal candidiasis, and genital molluscum contagiosum, which are known to have a non-sexual mode of transmission as well. We limited the analysis to patients with HIV coexisting with other STIs (instead of all HIV cases) since as per institutional policy, HIV patients were directed to attend the anti-retroviral treatment center of the institution under the department of Infectious Medicine, and only those with other coexisting STIs are referred to the STI clinic of Dermatology Department.

A comparison of the data from the COVID-19 period with the same from the pre-COVID-19 period showed a significant decline in the total number of cases during the COVID-19 era as reported by others.[7,11,12] The possibility of a lower incidence of STIs during COVID-19 cannot be ruled out, considering the probable impact of the social distancing measures on sexual behavior. Gleason *et al*., in a national survey from the United States in the initial months of the pandemic, reported a small but significant reduction in sexual activities, especially high-risk behaviors such as casual sex and sex with multiple partners.[13] The reduction in STIs documented could also be attributed to the conveyance difficulties experienced by patients to travel to a tertiary care center away from their homes in the setting of travel restrictions. Moreover, as our institution was a designated center for seriously ill COVID-19 patients, those with other health issues were encouraged to attend alternate medical facilities (unless absolutely indicated).[14]

We did not come across any previous study that compared the post-COVID-19 trend with that of pre-COVID-19 data. In a network-based model, Jenness *et al*. reported a possible rise in HIV and bacterial STIs among men who have sex with men in case of a longer duration of clinical service interruption and a relatively shorter duration of social distancing.[15]

Considering individual STIs, all STIs except congenital syphilis and condylomata acuminata showed a decline in the COVID-19 period and documented a rise in the post-COVID-19 period in comparison to the pre-COVID-19 period. From Table 3, it is obvious that viral STIs (in comparison to bacterial STIs) showed a more obvious decline in the COVID-19 period and a less marked rise in the post-COVID-19 period when compared with the pre-COVID-19 levels. In fact, the maximum number of condylomata acuminata cases sought treatment during the pre-COVID-19 period. The possibility of most of the affected individuals seeking treatment from peripheral centers during the COVID-19 period and the early post-COVID-19 period cannot be ruled out.

The marked rise noted in bacterial STIs during the post-COVID-19 period was mainly due to the surge in patients with syphilis of unknown duration. This, in turn, could be a reflection of the increased foreign travel and scheduling of many elective surgical procedures which were deferred during the COVID-19 period. Seventy-two out of the 149 patients (48.3%) with syphilis were detected to show positive serology while undergoing the mandatory medical checkup before going abroad. Twenty-three patients (23/149, 15.4%) received a diagnosis of syphilis while being evaluated for elective surgical procedures.

A disturbing trend noted was the rise (though not significant) in the proportion of infective syphilis cases during COVID-19 and post-COVID-19 periods and the congenital syphilis cases documented during the COVID-19 period. The child with congenital syphilis who presented during the COVID-19 period manifested vesicular rash, anemia, microscopic hematuria, and hepatosplenomegaly at birth, and further evaluation revealed the diagnosis. Both parents tested positive. Mother claimed to have received regular antenatal checkups, but had no documents to substantiate the same. Whether the fear of pregnant women and family members regarding frequent hospital visits during the pandemic had prevented them from receiving proper antenatal care remains unclear.

A meaningful analysis was not possible for non-gonococcal urethritis/cervicitis, gonococcal urethritis/cervicitis, trichomoniasis, and early syphilis due to the small number of cases.

The COVID-19 pandemic had a far-reaching impact on social behavior and healthcare-seeking patterns of the population worldwide. Stringent measures aimed to ensure social distancing had the potential to reduce transmission of STIs. However, the deployment of healthcare workers for COVID-19 management and the travel restrictions advocated had disrupted access to healthcare. This might have led to a delay in the diagnosis of STIs, which coupled with a lack of STI prevention counseling services (due to the scarcity of healthcare workers due to deployment for COVID-19-related activities), could have facilitated a social setting conducive to the spread of STIs.[7]

The decline in the proportion of patients whose partners could be evaluated in the post-COVID-19 period (which was even lower than the same noted in the COVID-19 period) points to the need to be aware of the fatigue in the system in the post-pandemic period and the need to revamp the healthcare system.

Limitations

Data from a single center and retrospective design were the major limitations.

CONCLUSION

STI counseling services and contact tracing need to be strengthened, and healthcare workers have to be re-educated and motivated to meet the challenges of the post-pandemic rise in STIs (as warned by CDC).[8] More information from multiple centers is essential to estimate the anticipated STI burden in the coming years to plan future strategies.

Ethical approval

The research/study approved by the Institutional Review Board at Government Medical College, Kozhikode, number GMCKKD/RP2022/IEC/133, dated November 24, 2022.

Declaration of patient consent

Patient's consent not required as patients identity is not disclosed or compromised.

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Conflicts of interest

There are no conflicts of interest.

Use of artificial intelligence (AI)-assisted technology for manuscript preparation

The authors confirm that there was no use of artificial intelligence (AI)-assisted technology for assisting in the writing or editing of the manuscript and no images were manipulated using AI.

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