Original Article

Epidemiology and changing trends of sexually transmitted diseases over the past 17 years in a tertiary care center: A retrospective study

Vibhu Mendiratta, Amit Kumar Meena, Damini Verma
Department of Dermatology and STD, Lady Hardinge Medical College, New Delhi, India

Address for correspondence:
Dr. Amit Kumar Meena, Room No. 209, House Surgeon Block, Lady Hardinge Medical College, Shaheed Bhagat Singh Marg, Connaught Place, New Delhi - 110 001, India.
E-mail: amitgothwal15@gmail.com

Abstract

Introduction: Sexually transmitted diseases (STDs) continue to be a major public health problem with significant burden on the society. Some of this can be attributed to our lack of knowledge about the change of disease spectrum from time to time. **Aims:** The aim of the study was to understand the changing pattern of STDs over the past 17 years (2003–2019). **Materials and Methods:** It was a retrospective study where data of patients who attended our Suraksha Clinic from 2003 to 2019 were collected. All the cases were subjected to detailed history, examination, and investigations done to rule out STDs. **Results:** A total of 2436 patients were included in the study. The majority of the patients were in the age group of 18–30 years. The most frequent diagnosis was vulvovaginal candidiasis, followed by herpes genitalis. 3.3% of patients had human immunodeficiency virus. 4.8% of patients were men sex men (MSM). Overall, viral STDs were most common, followed by fungal and bacterial. To understand the changing trends, data were divided into different phases according to the time period. During Phase 1 (2003–2007), viral STDs were most common, followed by bacterial and fungal. However, this trend changed in Phase 4 (2016–2019) and fungal STDs became most common. **Conclusions:** Despite numerous health initiatives, the number of STD cases is rising day by day. The increasing number of MSM over the study period necessitates dedicated efforts to address the health needs of this population. The National AIDS Control Organization should take necessary measures and steps to address the overall increase in STDs considering recent trends showing a drop in bacterial STDs and an increase in fungal and viral STDs.

Key words: Genital ulcer, herpes genitalis, homosexual, vulvovaginal candidiasis

Introduction

Sexually transmitted diseases (STDs) are very common among each stratum of society. Various risk factors predispose to STDs, out of which unprotected sexual contact is the most important factor. Others include intravenous drug abuse, alcohol addiction, and homosexuality.[1] STDs are considered a major public health problem in both developed and developing countries like ours. Due to inadequate infrastructure in our country, information regarding the profile of STDs mainly relies on syndromic diagnosis.[2] STDs are difficult to be studied epidemiologically due to variable clinical presentation, tendency of patients to hide, inadequate knowledge of general physicians, associated phobia, and stigma. To increase diagnostic yield of STDs, a number of advanced diagnostic techniques have been introduced, but the diagnosis and management is still based on syndromic approach given by the National AIDS Control Organization (NACO).

Our study aimed to study the patterns of STDs seen over the past 17 years in our center based on syndromic approach by the NACO.

Materials and Methods

The information of each STD patient is recorded on a pro forma and maintained in our Suraksha Clinic under Dermatology Department in Lady Hardinge Medical

Access this article online

Quick Response Code:

Website: www.ijstd.org

DOI: 10.4103/ijstd.ijstd_100_22

How to cite this article: Mendiratta V, Meena AK, Verma D. Epidemiology and changing trends of sexually transmitted diseases over the past 17 years in a tertiary care center: A retrospective study. Indian J Sex Transm Dis 2023;44:152-7.

Submitted: 11-Oct-2022 **Revised:** 03-Apr-2023
Accepted: 04-Aug-2023 **Published:** 06-Dec-2023

College. All the cases included in this study were diagnosed by the dermatologist and treated according to NACO's syndromic management guidelines. Hence, the pro forma of all the patients from January 2003 to December 2019 was evaluated and analyzed. Incomplete or inadequate proformas were excluded from the study. Furthermore, patients with complaints of sexual dysfunction, prostatorrhea, spermatorrhea, phimosis, paraphimosis, and nonvenereal genital dermatoses such as pearly penile papule and who did not have any evidence of STDs were excluded from the study.

Details of the epidemiological features, i.e., age, gender, marital status, occupation, duration and presenting complaints, sexual behavior, diagnosis, laboratory test results including human immunodeficiency virus (HIV), hepatitis B virus surface antigen, anti-hepatitis C virus antibody, Venereal Drug Research Laboratory (VDRL), and *Treponema pallidum* hemagglutination (TPHA) were recorded. Sexually transmitted infections (STIs) were categorized into different syndromes as depicted by the NACO in the syndromic management of STIs.

The data collected were entered in a Microsoft Excel spreadsheet, and for analysis, the Statistical Package for the Social Sciences (SPSS) software version 23 was used. Continuous variables were expressed as mean ± standard deviation, median, and range. Categorical variables were expressed as frequencies and percentages.

Results

A total of 2436 (males: 1284 and females: 1152) patients were included in our study during the time period of 2003–2019. The male-to-female ratio was 1.1:1. The majority of the patients were in the age group of 18–30 years (62.3%), followed by 31–40 years (23.8%), 41–50 years (9.5%), 51–60 years (1.9%), <18 years (1.9%), and >60 years (0.5%), with a mean age of diagnosis being 29.63 ± 9.24 years. The mean age of diagnosis in males and females was 30.25 ± 9.57 and 28.96 ± 8.77 years, respectively. The majority of the patients were married (81.7%), whereas unmarried were 17.9%. Marital status was not recorded in 0.4% of patients. Two thousand one hundred and ten (86.6%) patients were literate. Most common occupations included homemaker (36.2%), private jobs (26.9%), and students (7.7%). High-risk professions such as laborers, drivers, guards, and rickshaw pullers contributed 15.9% of the total. More than half (51.7%) had a history of substance abuse. Alcoholism, smoking, and other forms of addiction were recorded in 36.3%, 32%, and 0.5% of patients, respectively. High-risk behavior (premarital, extramarital, and >1 partner) was present in 64.7% of the patients. The most common presenting complaint was white or hyperpigmented raised lesions (24.7%), followed by discharge per vagina (24.1%) and genital ulcer (24%). The most frequent diagnosis was vulvovaginal candidiasis (22.3%), followed by herpes genitalis (21.2%), condyloma acuminata (14.3%), candidal balanoposthitis (11.5%), genital molluscum contagiosum (10.6%), syphilis (7.6%), gonococcal urethritis (4.5%), nongonococcal urethritis (2.9%), bacterial vaginosis (1.1%), genital scabies (0.9%), trichomoniasis (0.8%), gonococcal cervicitis (0.6%), nongonococcal cervicitis (0.6%), chancroid (0.4%), and lymphogranuloma venereum (0.2%). According to the syndrome categorized by the NACO, the most common syndrome was discharge per vagina (24.1%), genital ulcer disease (24%), anogenital warts (14.3%), molluscum contagiosum (10.6%), urethral discharge and burning micturition (7.9%), and inguinal bubo (0.2%). The most common STD in males and females was herpes genitalis and vulvovaginal candidiasis, respectively. More than one STDs were noted in 11.7% of the patients. 4.9% of patients had a history of previous STD. Few of the patients had additional comorbidities such as diabetes mellitus (1.7%) and tinea cruris or intertrigo (1.4%). Thirty-seven patients (1.5%) were pregnant. Eighty-one (3.3%) patients were HIV positive. The most common STD in pregnant females was condyloma acuminata (32.4%), followed by vulvovaginal candidiasis (27%) and herpes genitalis (16.2%). The distribution of STDs in HIV-positive patients is shown in Table 1. VDRL and TPHA were reactive in 5% and 5.3% of the patients, respectively. Hepatitis B and hepatitis C were reactive in 9 (0.4%) and 1 patient, respectively. One hundred and seventeen patients (4.8%) had a history of homosexual contact. The distribution of STDs in homosexual contact is shown in Table 2 and Figure 1. A maximum number of homosexual contacts were seen during the time period of 2016–2019 (75.2%), followed by 2003–2007 (12.8%), 2012–2015 (6.8%), and 2008–2011 (5.1%).

To understand the changing trends, the data were further divided into different phases according to the time period. The time period from 2003 to 2007 was considered Phase 1, 2008–2011 as Phase 2, 2012–2015 as Phase 3, and 2016–2019 as Phase 4. A maximum number of patients were diagnosed with STDs during Phase 4 (56.5%), followed by Phase 3 (17.7%), Phase 2 (13.4%), and Phase 1 (12.3%), as shown in Figure 2. According to the etiology, overall viral STDs were most common (46.7%), followed by fungal (34.0%), bacterial (17.5%), and parasitic (1.8%), as depicted in Figure 3. Among viral STDs, most common was herpes genitalis, followed by condyloma acuminata. During Phase 1, viral STDs were most common (60.7%), followed by bacterial (26.0%) and

Table 1: Distribution of sexually transmitted diseases in human immunodeficiency virus-positive patients

Sexually transmitted disease	Number of patients, *n* (%)
Herpes genitalis	35 (43.2)
Condyloma acuminata	11 (13.5)
Vulvovaginal candidiasis	9 (11.1)
Molluscum contagiosum	9 (11.1)
Syphilis	8 (9.8)
None	9 (11.1)
Total	81 (100)

HIV=Human immunodeficiency virus

Table 2: Distribution of sexually transmitted diseases in homosexual contacts (men sex men)

Sexually transmitted disease	Number of patients, *n* (%)
Syphilis	49 (41.8)
Condyloma acuminata	16 (13.6)
Candidal balanoposthitis	15 (12.8)
Herpes genitalis	13 (11.1)
Molluscum	10 (8.5)
Gonococcal urethritis	5 (4.2)
Gonococcal proctitis	5 (4.2)
Nongonococcal urethritis	3 (2.5)
Inguinal bubo	1 (0.85)
Total	117 (100)

MSM=Men sex men

fungal (12.0%). However, this trend changed in Phase 4 and fungal STDs (41.6%) became most common, followed by viral (40.3%) and bacterial (16.3%), as depicted in Table 3.

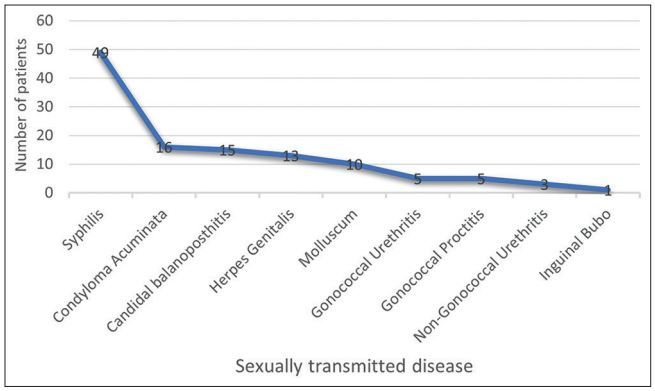

Figure 1: Distribution of sexually transmitted diseases in men sex men

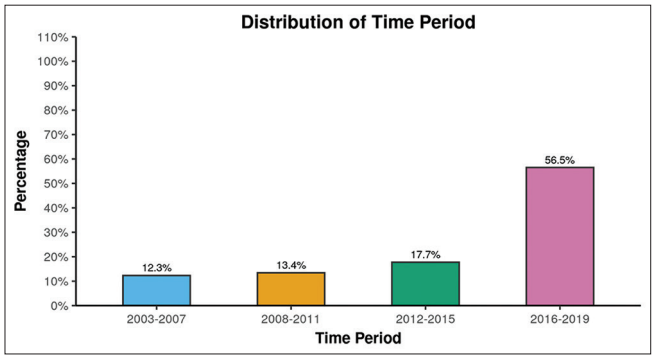

Figure 2: Distribution of sexually transmitted diseases during each time period

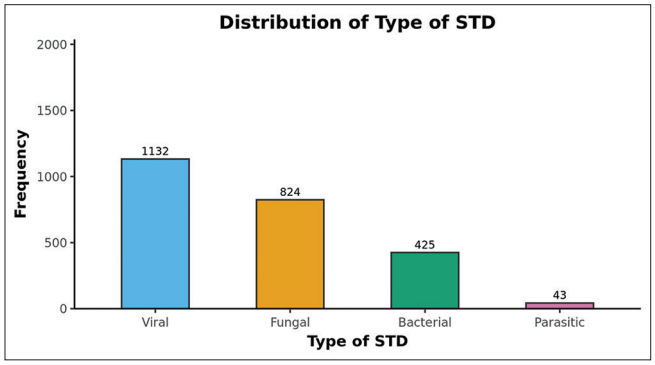

Figure 3: Overall distribution of sexually transmitted diseases according to etiology. STD: Sexually transmitted diseases

Discussion

Our study included a total of 2436 patients, in which males constituted 52.7% and females constituted 47.3% with a sex ratio of 1.1:1. Demographic characteristics of study population with STDs is mentioned in Table 4. Male predominance was in accordance with previous studies.[3-5] However, in a study by Nyati *et al*.,[5] female patients outnumbered males which may be due to the inclusion of female patients seen in the gynecology outpatient department. A lower number of females as compared to males may be indicative of poor accessibility of females to health-care services, social restrictions/stigma, and visit to gynecologist rather than dermatologist for genital diseases including STDs.

The majority of the patients were in the age group of 18–30 years (62.3%), followed by 31–40 (23.8%) years, with a mean age of diagnosis being 29.63 ± 9.24 years. This is in concordance with the other studies from India.[5-8] This is the most sexually active and productive age group, so there are higher chances of acquisition of STDs. The other reasons could be multiple sexual partners, high-risk-taking behavior, and frequent change of partners.

The prevalence of STDs was more in married people (81.7%) as compared to unmarried people (17.9%) which was similar to other studies.[9,10] Although, in India, sexual relation before marriage is not socially and culturally acceptable. However, a high incidence of premarital sexual contact has been reported by Kanbargi and Kanbargi.[9]

Among the occupational groups, majority (881) were homemakers (36.2%), followed by private jobs (26.9%) and students (7.7%). Other professions such as laborers, drivers, guards, and rickshaw pullers contributed 15.9% of the total. Nanjundaswamy *et al*.[6] reported that the most common occupational group affected was homemaker (31.9%), which was in consonance with our study. Total homemakers in our study were 881 (36.2%). Out of these, only 250 (28.3%) had a history of high-risk behavior. Five hundred and fifty (62.4%) homemakers gave a history of high-risk behavior in their male counterparts. The rest 81 (9.98%) did not give a history of high-risk behavior in self and partner. Although male counterparts of the homemakers were called for STI evaluation, most (99%) of them did not come for evaluation. Hence, we cannot comment on status of STI in male counterparts of the homemakers. The higher prevalence of STDs in homemakers could be due to multiple sexual contacts of their male partners outside the marriage,[6] lack of knowledge of barrier contraception, and safe sex practices. Students constituted 7.7% of total STD patients, which is a cause of concern. This highlights the importance of including education about STDs and HIV as a part of their formal education so as to address this issue more appropriately and to decrease the burden of STDs in the society.

Table 3: Trend of sexually transmitted diseases during the past 17 years

Etiology of sexually transmitted disease	Time period				
	Phase 1 (2003-2007), *n* (%)	Phase 2 (2008-2011), *n* (%)	Phase 3 (2012-2015), *n* (%)	Phase 4 (2016-2019), *n* (%)	Total, *n* (%)
Viral	182 (60.7)	203 (62.7)	195 (45.3)	552 (40.3)	1132 (46.7)
Fungal	36 (12.0)	56 (17.3)	162 (37.7)	570 (41.6)	824 (34.0)
Bacterial	78 (26.0)	57 (17.6)	67 (15.6)	223 (16.3)	425 (17.5)
Parasitic	4 (1.3)	8 (2.5)	6 (1.4)	25 (1.8)	43 (1.8)
Total	300 (100.0)	324 (100.0)	430 (100.0)	1370 (100.0)	2424 (100.0)

Table 4: Demographic characteristics of study population with sexually transmitted diseases

Parameter	Result
Gender, *n* (%)	
Male	1284 (52.7)
Female	1152 (47.29)
Total	2436 (100)
Male:female	1.1:1
Age (years), mean±SD	29.63±9.24
Male, mean±SD	30.25±9.57
Female, mean±SD	28.96±8.77
Age groups (years), *n* (%)	
<18	48 (1.9)
18-30	1517 (62.3)
31-40	580 (23.8)
41-50	231 (9.5)
51-60	48 (1.9)
>60	12 (0.5)
Educational status, *n* (%)	
Literate	2110 (86.6)
Illiterate	326 (13.4)
Occupation, *n* (%)	
Homemakers	881 (36.2)
Private jobs	656 (26.9)
Students	188 (7.7)
Laborers	144 (5.9)
Drivers	137 (5.6)
Others (guards, rickshaw pullers, tailors, unemployed, etc.)	430 (17.7)
Substance abuse, *n* (%)	1260 (51.7)
Alcohol	884 (36.3)
Smoking	780 (32)
Clinical presentation, *n* (%)	
White or hyperpigmented raised lesions	601 (24.7)
Discharge per vagina	588 (24.1)
Genital ulcer	584 (24)
Discharge/burning micturition per urethra	193 (7.9)
Itching/swelling over genitalia	162 (6.7)
Fissuring over glans	114 (4.7)
Asymptomatic with VDRL/HIV/HBsAg/HCV test positive	98 (4.02)
Copper-colored lesions over palms and soles	50 (2.1)
Perianal discharge/hyperpigmented lesions over the perianal area	32 (1.3)
Partner of patient with STD	6 (0.2)
Inguinal swelling	4 (0.2)
Symptoms suggestive of immunosuppression	4 (0.2)

VDRL=Venereal Drug Research Laboratory; HIV=Human immunodeficiency virus; STD=Sexually transmitted disease; HBsAg=Hepatitis B surface antigen; HCV=Hepatitis C virus; SD=Standard deviation

One thousand two hundred and sixty (51.7%) of the study population had a history of substance abuse. Alcoholism, smoking, and other forms of addiction were recorded in 36.3%, 32%, and 0.5% of patients, respectively. Majority (78.09%) of these were males and females constituted only 21.9%. Impact of alcohol use on STDs including HIV has been done in only few studies. Since current strategies for preventing STDs are largely based on the modification of high-risk behavior, this area requires special attention.[10,11]

According to the World Health Organization (WHO), more than 1 million STIs are acquired every day. In 2020, the WHO estimated 374 million new infections with 1 of 4 STDs: chlamydia (129 million), gonorrhea (82 million), syphilis (7.1 million), and trichomoniasis (156 million).[12] According to the NACO, through 1822 designated sexually/reproductive transmitted infection clinics (DSRC), 70 lakh STI/RTI client visits were managed in 2020–2021.[13] According to the WHO 2016 data, more than 490 million (13%) people were estimated to be living with herpes genitalis worldwide.[12]

The most common STD in our study was vulvovaginal candidiasis (22.3%) closely followed by herpes genitalis (21.2%) and condyloma acuminata (14.3%). The most common STD in females was vulvovaginal candidiasis (43.2%), followed by herpes genitalis (16.7%), condyloma acuminata (14.8%), and molluscum contagiosum (11.8%). Similar to our study, vulvovaginal candidiasis was found to be the most common STD in females in other studies from different parts of India.[6,14,15] In contrast to our study, Puri *et al*.[16] found bacterial vaginosis as the most common cause of vaginal discharge.

In males, the most common STD was herpes genitalis (25.2%), followed by candidal balanoposthitis (21.2%), condyloma acuminata (13.7%), and molluscum contagiosum (9.5%). Nyati *et al*.,[5] Hassan *et al*.,[14] and Sarkar *et al*.[8] also reported herpes genitalis as the most common STD in males. Nyati *et al*.[5] reported condyloma acuminata and molluscum contagiosum as the second and third most common STDs in their study. The reason behind herpes genitalis and candidal balanoposthitis as most common STDs may be to their symptomatic nature, so early presentation and most patients seeking treatment. The other reason could be that viral and fungal infections of the genital tract are chronic and recurrent in nature and have a high frequency of recurrence.

11.7% of the patients had more than one STD. Narayanan[2] and Nyati *et al*.[5] reported >1 STDs in 6.2% and 1.69% of the patients, respectively. This is much lesser than our study. The prevalence of HIV in our study was 3.3%. This is similar to a study conducted by Nyati *et al*.[5] (3.6%). According to the NACO 2019 report, the HIV prevalence in India is 0.22%. The HIV prevalence trend has been declining in India since the epidemic's peak in the year 2000 and has been stabilizing in recent years.[17] According to the WHO, an estimated 0.7% of adults aged 15–49 years worldwide are living with HIV.[18] HIV and STDs are related to each other. Both increase the chances of transmission of one another. The prevalence of HIV in India varies from state to state. Local factors such as education, awareness, knowledge about STDs, rural or urban area, and access to health-care facilities may be responsible for this wide variation. The most common STD in HIV-positive patients was herpes genitalis (43.2%), followed by condyloma acuminata (13.5%).

VDRL and TPHA were reactive in 5% and 5.3% of the patients. VDRL reactivity ranges from 0.9% to 9.95% in different studies from India.[5,18] Our results were also in this range.

History of homosexual contact was present in 117 (4.8%) patients. A maximum number of homosexual contacts were seen during Phase 4 (75.2%). All these patients were men sex men (MSM). A rising trend in MSM behavior may be due to the increased use of dating apps specifically for homosexuals such as Grindr,[19] legalization of LGBTQ (lesbian, gay, bisexual, transgender, and queer), decreasing stigma of MSM, and easy access to health care. The most common STD in MSM was syphilis (41.8%), followed by condyloma

acuminata (13.6%). However, in a recent study from Delhi, condyloma acuminata (23.08%) was the most common STD, followed by syphilis (21.15%).[20] However, Aggarwal *et al*.[21] reported herpes genitalis followed by syphilis as the most common STDs. Seven (5.98%) MSM were HIV positive and 15 (12.8%) had a history of previous STD, which was higher than heterosexual patients as mentioned above. Around 33% of the MSM were married to a female counterpart, thus serving as an important bridging group between MSM and their female partner. The prevalence of STDs among MSM is rising globally.[22] Factors responsible for increased prevalence of STDs in MSM are high frequency of anal intercourse, less use of barrier contraceptive (condom), high-risk-taking behavior, increased use of substance abuse, and multiple partners.[23,24]

Considering the year-wise (time period) distribution, with each successive time period, there has been an increase in the number of STD cases in our study. Out of the total STD patients, majority (56.5%) were seen in the time period of 2016–2019. This is similar to a study by Hassan *et al*.[14] However, most of the studies have shown decreasing year-wise trend in STDs.[2,3,15] The reason for increase in the prevalence of STDs may be due to increase in extramarital and premarital sexual relations, migration due to profession, women taking up jobs outside home,[9] and increased use of social media (dating apps).[19] The other reason could be more and more people seeking treatment for STDs rather than hiding it.

On the basis of causative organisms, we divided STDs into bacterial, viral, fungal, and parasitic. Overall, viral STDs were most common (46.7%), followed by fungal (34.0%), bacterial (17.5%), and parasitic (1.8%). During Phase 1, viral STDs were most common (60.7%), followed by bacterial (26.0%) and fungal (12.0%). However, this trend changed drastically in Phase 4 and fungal STDs (41.6%) became most common, followed by viral (40.3%) and bacterial (16.3%). Data from the recent years in our study showed that both viral and bacterial STDs have decreased, whereas fungal STDs have increased. Rising trend of fungal STDs and falling trend of bacterial STDs similar to our study have also been reported in a recent study from Karnataka.[6] However, in contrast to our study, this study reported an increased trend of viral STDs.[6] In India, similar to developed countries, bacterial STDs such as chancroid and gonorrhea are declining, whereas viral STDs such as herpes genitalis and condyloma acuminata are on a rising trend.[2,3,25] This may be because of syndromic treatment in peripheral centers, thereby obviating the need to attend STD clinics in a tertiary center and inadvertent use of antibiotics for related and unrelated diseases.[26] Increased prevalence of fungal STIs in Phase 4 could also be attributed to multiple other factors such as increased global warming, humidity, change in clothing habits, increased use of public toilets, and increased resistance to antifungal agents in candidal species.[27]

Conclusions

In our study, majority of the STDs occur in the age group of 18–30 years which is the most productive age group. Despite so many public health programs organized by the government and nongovernment organizations, STD cases are increasing day by day. The increase in the number of MSM is also a matter of concern as this group serves as an important bridge population. Recent years have shown a decline of bacterial STDs and rising trend of viral and fungal STDs which should be kept in mind, and appropriate measures and policies should be adopted by the NACO to tackle the overall increase in STDs. There is also a need to increase awareness among general population to prevent the spread of STDs.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

References

1. Verma RK, Collumbien M. Homosexual activity among rural Indian men: Implications for HIV interventions. AIDS 2004;18:1845-7.
2. Narayanan B. A retrospective study of the pattern of sexually transmitted diseases during a ten-year period. Indian J Dermatol Venereol Leprol 2005;71:333-7.
3. Jaiswal AK, Banerjee S, Matety AR, Grover S. Changing trends in sexually transmitted diseases in North Eastern India. Indian J Dermatol Venereol Leprol 2002;68:65-6.
4. Devi SA, Vetrichevvel TP, Pise GA, Thappa DM. Pattern of sexually transmitted infections in a tertiary care Centre at Puducherry. Indian J Dermatol 2009;54:347-9.
5. Nyati A, Gupta S, Jain SK, Yadav D, Patidar BL, Sharma M. A retrospective study of the pattern of sexually transmitted infections from a tertiary care hospital of Rajasthan. Indian J Sex Transm Dis AIDS 2017;38:147-51.
6. Nanjundaswamy BL, Surendran KA, Satish S, Setty NK, Chandrakumar L. Changing trends in sexually transmitted diseases during a seven year period- a retrospective study in STD clinic of a tertiary care hospital. Indian J Clin Exp Dermatol 2020;6:35-40.
7. Saikia L, Nath R, Deuori T, Mahanta J. Sexually transmitted diseases in Assam: An experience in a tertiary care referral hospital. Indian J Dermatol Venereol Leprol 2009;75:329.
8. Sarkar S, Patra AC, Srinivas P, Ghosh A, Kushbaha G, Saha S. Pattern of sexually transmitted infections: A profile from a rural- and tribal-based sexually transmitted infections clinic of a tertiary care hospital of Eastern India. J Family Med Prim Care 2018;7:1042-6.
9. Kanbargi R, Kanbargi S. Sexually transmitted diseases in Bangalore city: Some findings from an exploratory study. J Fam Welf 1996;42:30-7.
10. National Research Council (US) Committee on AIDS Research and the Behavioral, Social, and Statistical Sciences, Turner CF, Miller HG, Moses LE, editors. AIDS: Sexual Behavior and Intravenous Drug Use. Washington (DC): National Academies Press (US); 1989. Available from: https://www.ncbi.nlm.nih.gov/books/NBK218615/. [Last accessed on 2021 Oct 06].
11. Higgins DL, Galavotti C, O'Reilly KR, Schnell DJ, Moore M, Rugg DL, *et al*. Evidence for the effects of HIV antibody counseling and testing on risk behaviors. JAMA 1991;266:2419-29.
12. Sexually Transmitted Infections (STIs). Available from: https://www.who.int/news-room/fact-sheets/detail/sexually-transmitted-infections-(stis). [Last accessed on 2023 Apr 03].
13. NACO Data on Sexually Transmitted Infections. Available from: https://naco.gov.in/sites/default/files/SankalakStatusofNationalAIDSResponseThirdEdition2021.pdf. [Last accessed on 2023 Apr 03].
14. Hassan I, Anwar P, Rather S, Sameem F, Majid I, Jabeen Y, *et al*. Pattern of sexually transmitted infections in a Muslim majority region of North India. Indian J Sex Transm Dis AIDS 2015;36:30-4.
15. Nair SP. A study of the changing trends in the pattern of sexually transmitted infections in the state of Kerala. Indian J Sex Transm Dis AIDS 2012;33:64-5.
16. Puri KJ, Madan A, Bajaj K. Incidence of various causes of vaginal discharge among sexually active females in age group 20-40 years. Indian J Dermatol Venereol Leprol 2003;69:122-5.
17. HIV Facts and Figures | National AIDS Control Organization | MoHFW | GoI. Available from: https://naco.gov.in/hiv-facts-figures. [Last accessed on 2023 Mar 23].

18. Available from: https://www.who.int/news-room/fact-sheets/detail/hiv-aids. [Last accessed on 2023 Mar 23].
19. Vora R, Anjaneyan G, Doctor C, Gupta R. Clinico-epidemiological study of sexually transmitted infections in males at a rural-based tertiary care center. Indian J Sex Transm Dis AIDS 2011;32:86-9.
20. Alsing KK, Sejersen TS, Jemec GB. Geosocial dating applications mirror the increase in sexually transmitted diseases. Acta Derm Venereol 2021;101:adv00378.
21. Aggarwal P, Bhattar S, Sahani SK, Bhalla P, Garg VK. Sexually transmitted infections and HIV in self reporting men who have sex with men: A two-year study from India. J Infect Public Health 2016;9:564-70.
22. Setia MS, Lindan C, Jerajani HR, Kumta S, Ekstrand M, Mathur M, *et al*. Men who have sex with men and transgenders in Mumbai, India: An emerging risk group for STIs and HIV. Indian J Dermatol Venereol Leprol 2006;72:425-31.
23. Mayer KH. Sexually transmitted diseases in men who have sex with men. Clin Infect Dis 2011;53 Suppl 3:S79-83.
24. Illa L, Brickman A, Saint-Jean G, Echenique M, Metsch L, Eisdorfer C, *et al*. Sexual risk behaviors in late middle age and older HIV seropositive adults. AIDS Behav 2008;12:935-42.
25. Mansergh G, Flores S, Koblin B, Hudson S, McKirnan D, Colfax GN, *et al*. Alcohol and drug use in the context of anal sex and other factors associated with sexually transmitted infections: Results from a multi-city study of high-risk men who have sex with men in the USA. Sex Transm Infect 2008;84:509-11.
26. Chandragupta TS, Badri SR, Murty SV, Swarnakumari G, Prakash BV. Changing trends of sexually transmitted diseases at Kakinada. Indian J Sex Transm Dis AIDS 2007;28:6.
27. Thappa DM, Kaimal S. Sexually transmitted infections in India: Current status (except human immunodeficiency virus/acquired immunodeficiency syndrome). Indian J Dermatol 2007;52:78.