

## Original Research Article

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## Etiology of Genital Ulcerative Disease in Conjunction with HIV Infection among Patients Attending the STD Clinic at a Tertiary Care Hospital

Kiran Meena<sup>1\*</sup>, Rameshwari Bithu<sup>2</sup> and Rakesh Kumar Maheshwari<sup>3</sup>

Department of Microbiology, SMS Medical College, Jaipur, India

\*Corresponding author

### ABSTRACT

#### Keywords

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Sexually transmitted infections (STIs) in particular Genital Ulcer Diseases (GUDs), have been associated with an increased risk for infection and transmission. Genital Ulcer Diseases (GUDs) can be caused by a number of sexually transmitted infections. Patients with GUD are at high risk for concurrent HIV infection. Blood samples were collected from a total of 260 patients. Diagnostic tests were performed using specific kits as per manufacturer's instructions. Out of 260 patients, 216 (83.08%) patients were under herpetic category whereas 44 (16.92%) patients were non-herpetic. Overall seroprevalence of HSV-2, syphilis and HIV in this study was 29.62%, 16.15% and 5.38% respectively. Individuals from rural areas and males were infected predominantly with GUD cases (28.84% & 36.92% respectively). The present study reveals that herpetic cases are predominant over the non herpetic cases in GUDs with HSV-2 as the major infective agent. In non-herpetic cases, syphilis was more predominant. Incidences of HIV were more in mixed infections, further conferring those STIs, specifically GUDs can play a major role in HIV infection and / or transmission.

### Introduction

Genital Ulcer Diseases are defined as ulcerative, erosive, pustular or vesicular genital lesion(s), with or without regional lymphadenopathy, caused by a number of sexually transmitted infections (STIs) and non-STI-related conditions (PHAC, 2013). The etiology of GUD varies globally and temporally. For most young, sexually active patients with GUD, etiology is related to an STI. The annual global incidence of GUD probably exceeds 20 million cases. Four infectious agents have so far been identified as common causes of GUD namely, herpes simplex virus type 2 (HSV-2), HSV-1, which are known to cause genital herpes *Treponema*

*pallidum*, which is known to cause syphilis, and *Haemophilus ducreyi*, which causes chancroid (Mertz *et al.*, 1998; Orle *et al.*, 1996; Bruisten *et al.*, 2001; Risbud *et al.*, 1998). In addition, the GUD has been recognized as an epidemiologic and biologic risk factor for the transmission of the human immunodeficiency virus (HIV) (Moodley *et al.*, 2002; Malima *et al.*, 2008).

The cause of GUD can be related to a number of factors, such as geographical area where sexual intercourse has taken place; socioeconomic factors; gender of sexual partners; number of partners; HIV status and

local prevalence; drug use; commercial sex; and circumcision (Ballard, 1999; Malima *et al.*, 2008; Mbopi-Keou *et al.*, 2000). Majority of genital ulcers (~70 to 80%) are either due to HSV-1 or HSV-2 (PHAC, 2013; Malima *et al.*, 2008) but, globally, majority of cases are caused by HSV-2 (Prabhakar *et al.*, 2012; Patwardhan and Bhalla, 2016). In addition, the genital ulcers in sexually active persons can be associated with two or more pathogens. Women and men with GUD are at increased risk of acquiring and transmitting HIV (Celum, 2004).

Currently in India, the diagnosis and management of GUD are based mainly on the clinical presentation of the ulcer itself since laboratory diagnosis is unavailable at most places (Prabhakar *et al.*, 2012). In 1991, World Health Organization (WHO) developed simple algorithms for prompt diagnosis and treatment of bacterial sexually transmitted infections, which included flow charts for the management of GUD (WHO, 1991). Following the rise in prevalence of HSV-2 in sub-Saharan Africa, GUD syndromic management flow charts were revised in 2003 to include antiviral treatment (WHO, 2004). The current national STI guidelines in India recommend classification and treatment of GUD syndrome according to the clinical presentation.

The etiology of GUD varies both geographically and temporally (Morse *et al.*, 1997). In developing countries, leading causes of GUD are infections with *H. ducreyi*, followed by infections with *T. pallidum* and HSV infections while the situation is different in European countries and North America, where HSV-2 infection is the leading cause of genital ulcers (Bruisten *et al.*, 2001). A change in the prevalence patterns of the different causative agents of GUD in relation to HIV-1 infection. Some observations also indicate a more severe and prolonged clinical

presentation as well as a decreased response to treatment in HIV-1-infected people (Moodley *et al.*, 2003). There are not many studies from the developing countries, like India and no study in the state of Rajasthan to corroborate such findings, largely due to a lack of reliable laboratory data to back such studies. The present study was conceived out with the primary objective of determining the recent trends in the etiology of GUDs by employing accurate laboratory methods of diagnosis. It is an attempt to determine the role of the laboratory in GUD case management in the state of Rajasthan.

## **Materials and Methods**

This study is a hospital based descriptive type of observational study (cross sectional study). In this study, clinically diagnosed Genital Ulcerative Disease (GUD) cases reported at STD clinic of Skin and VD department, SMS Hospitals were included on first come first bases during the months of April 2015 to April 2016 to find the magnitude of Herpes Simplex Virus-2 IgM antibodies, Syphilis antibodies and Human immunodeficiency virus antibodies in GUD cases. Those who did not give consent were excluded.

A total 260 blood samples were collected in plain vials from the patients of GUD with informed written consent at STD clinic of Skin and VD department, SMS Hospitals, Jaipur. Serum was separated from blood sample after centrifugation at 3000 rpm for 10 min and 200 µl serum was aliquoted in three cryovials each. After separation of serum, all samples were tested for HSV-2 IgM antibody by ELISA method using Enzywell Herpes Simplex-2 IgM kit (Diesse, Italy), and Syphilis antibody by Rapid Plasma Reagin (RPR) test using RPR invitro qualitative and semi quantitative kit (Span Diagnostic Ltd., India). Samples which were reactive for RPR are further confirmed by *Treponema pallidum*

haemagglutination Assay (TPHA) (Lab21 Health Care Ltd., UK).

The detection of HIV in a patient's sample was done as per the National Guidelines for HIV testing (NACO, 2015). Initially Dot immunoassay was performed for the detection of HIV 1 and/or 2 antibodies using Combaids – RS advantage ST (HIV 1+2 immunodot test) kit (Aarkay Healthcare, India), followed by rapid visual test for the qualitative and differential detection of HIV-1 and HIV-2 in human blood using HIV Tri-Dot kit (J. Mitra, India) and immunochromatographic assay for the differential and qualitative detection of all isotypes (IgG, IgM, IgA) antibodies specific to HIV-1 including subtype O and HIV-2 simultaneously using the SD Bioline HIV1/2 3.0 Kit (SD Bioline, India).

### **Results and Discussion**

The patients were divided into two groups based on syndromic diagnosis namely herpetic and non-herpetic. Out of 260 patients included in the study, a total of 216 (83.08%) patients were grouped under herpetic category whereas 44 (16.92%) patients were categorised as non-herpetic. In the herpetic category, 171 (79.17%) individuals were male and 45 (20.83%) individuals were female whereas in the non-herpetic group, 38 (86.36%) individuals were male and 06 (13.64%) individuals were female. In the herpetic syndrome category, 69 (31.94%) were positive for HSV-2 IgM Ab, 08 (3.70%) were positive for Syphilis Ab, 01 (0.46%) was positive for HIV Ab, 02 (0.93%) were positive for both HSV-2 IgM Ab and Syphilis Ab, 05 (2.32%) were positive for both HSV-2 IgM Ab and HIV Ab, 03 (1.39%) were positive for both Syphilis Ab and HIV Ab, 01 (0.46%) was positive for all three types of Abs while in the non-herpetic syndrome category, 24 (54.55%) were positive for Syphilis Ab and 04 (9.09%) were positive for both Syphilis Ab and HIV Ab.

Out of 260 patients involved in the present study, 209 (80.38%) were male and 51 (19.62%) were female. Out of 209 males studied, 56 (26.79%) were positive for HSV-2 IgM Antibody (Ab), 27 (12.92%) were positive for Syphilis Ab, 01 (0.48%) was positive for HIV Ab, 02 (0.96%) were positive for both HSV-2 IgM Ab and Syphilis Ab, 03 (1.43%) were positive for both HSV-2 Ab positive and HIV Ab, 06 (2.87%) were positive for both Syphilis Ab and HIV Ab, 01 (0.48%) was positive for all the three types of Antibodies (Abs) and 113 (54.07%) were negative for all the three types of Abs *i.e.* HSV-2 IgM Ab, Syphilis Ab and HIV Ab (Table 1). Out of 51 females studied, 13 (25.50%) were positive for HSV-2 IgM Ab, 05 (9.80%) were positive for Syphilis Ab, 02 (3.92%) were positive for HSV-2 IgM Ab and HIV Ab, 01 (1.96%) was positive for Syphilis Ab and HIV Ab and 30 (58.82%) were negative to all the three types of Abs *i.e.* HSV-2 IgM Ab, Syphilis Ab and HIV Ab (Table 1).

Out of 260 patients involved in the present study, majority of individuals *i.e.* 120 (46.15%) were from the age group 21–30 years, of which males were sharing a majority portion of 81.67%. The trend was found followed by the individuals from 31–40 years age group with 95 (36.55%) individuals, 15–20 years age group with 29 (11.15%) individuals, 41–50 years age group with 14 (5.38%) individuals and 02 (0.77%) individuals from age group above 50 years (Table 2).

The incidence of GUD was found more in the married group with 187 (71.92%) individuals followed by unmarried group with 50 (19.23%), separated group with 9 (3.46%), divorced group with 08 (3.08%) and widow group with 06 (2.31%) individuals respectively. From the individuals enrolled in the present study, majority belongs to the

labour class (16.92%), followed by employees of private sector (14.62%), house wives (12.31%). Hard working class such as drivers and farmers came next with 28 (10.77%) and 27 (10.38%) individuals, respectively. The student category occupied the next place with 26 (10%) individuals affected followed by employees of government sector with 24 (9.23%), shopkeepers with 21 (8.08%) and unemployed with 20 (7.69%) individuals affected (Table 3).

The serological profiling for the antibodies revealed that out of 234 heterosexual individuals, 61 (26.07%) were positive for HSV-2 IgM Ab, 28 (11.97 %) were positive for Syphilis Ab, 02 (0.85%) were positive for both HSV-2 IgM Ab and Syphilis Ab, 02 (0.85%) were positive for both HSV-2 IgM Ab and HIV Ab, 04 (1.71%) were positive for both Syphilis Ab and HIV Ab, 01 (0.42%) was positive for all the three types of Abs and 136 (58.13%) were negative for all the three types of Abs *i.e.* HSV-2 IgM Ab, Syphilis Ab and HIV Ab. Out of 08 bisexule 02 (25%) were positive for HSV-2 IgM Ab, 01(12.50%) was positive for Syphilis Ab, 01 (12.50%) was positive for both HSV-2 IgM Ab and HIV Ab, 02 (25%) were positive for both Syphilis Ab and HIV Ab and 02 (25%) were negative for all the three types of Abs *i.e.* HSV-2 IgM Ab, Syphilis Ab and HIV Ab. The serological profile of GUD patients with single partner revealed 21 (20.39%) were positive for HSV-2 IgM Ab, 09 (8.74%) were positive for Syphilis Ab, 01 (0.97%) were positive for both Syphilis Ab and HIV Ab and 72 (69.9%) were negative to all the three types of Abs *i.e.* HSV-2 IgM Ab, Syphilis Ab and HIV Ab. In the individuals having two sexual partners, 01 (8.33%) were positive for HSV-2 IgM Ab, 02 (16.67%) were positive for Syphilis Ab and 09 (75%) were negative to all the three types of Abs *i.e.* HSV-2 IgM Ab, Syphilis Ab and HIV Ab. In individuals having more than two sexual partners 41

(32.8%) were positive for HSV-2 IgM Ab, 17 (13.6%) were positive for Syphilis Ab, 02 (1.6%) were positive for both HSV-2 IgM Ab and Syphilis Ab, 03 (2.4%) were positive for both HSV-2 Ab positive and HIV Ab, 05 (4%) were positive for both Syphilis Ab and HIV Ab, 01 (0.8%) were positive for all the three types of Abs and 56 (44.8%) were negative for all the three types of Abs *i.e.* HSV-2 IgM Ab, Syphilis Ab and HIV Ab.

From the present study, out of 209 males, 21 (91.30%) were regular users of condoms while 33 (100%) were occasional user and 148 (80.43%) were non users. In 51 females, 2 (8.7%) were regular users of condoms while 36 (19.57%) were non users and 20 (7.69) individuals refuse to give history of usage of condoms.

To elucidate the role of GUD in BOH, out of 51 females from the present study only 45 female individuals were included in this part of study as 6 females were unmarried. Out of 45 females, 18 (40%) were found to have BOH while 23 (51.1%) were having BOH and 04 (8.9%) females did not give obstetric history. From the serological profile of females with BOH, 06 (33.33%) were positive for HSV-2 IgM Ab, 03 (16.67%) were positive for Syphilis Ab, 02 (11.11%) were positive for both HSV-2 Ab and HIV Ab, 01 (5.56%) was positive for both Syphilis Ab and HIV Ab and 06 (33.33%) were negative for all the three types of Abs *i.e.* HSV-2 IgM Ab, Syphilis Ab and HIV Ab. Comparison to females with no BOH, 04 (17.39%) were positive for HSV-2 IgM Ab, 02 (8.7%) were positive for Syphilis Ab, 17 (73.91%) were negative for all the three types of Abs (Table 5). In the present study, 80.38% recruits were males while 19.62% were female, of which 36.92% and 8.08% were infected with GUD in males and females respectively with a ratio of 4.56:1. Among these, males outnumbered females in HSV-2,



syphilis and HIV infections in single and multiple infections. Studies made elsewhere also reveal the same pattern. In a study, males (83.79%) outnumbered females (16.21%) and male to female ratio was 5.17:1. 68.5% of cases belong to the age group of 20-40 years (Jain *et al.*, 2008). In studies from Africa, genital herpes accounted for more than three quarters of all cases of GUD. In the total 434 GUD samples evaluated, 84.8% were men. DNA from HSV-2 was detected in 55.3% of GUD samples, *T. pallidum* in 8.3%, HSV-1 in 3.2% along with HIV serology among GUD patients was 3.2% (Naveca *et al.*, 2013). In another African country based study, HSV-2 serology was found in 78.57% individuals whereas HIV positivity was recorded in 40% individuals (Mwansasu *et al.*, 2002). From the present study, the herpetic cases are upto a magnitude of 83.08% whereas non-herpetic cases are only upto 16.92%. Studies made in India and elsewhere also reveal the same pattern. A study from Pune based STD clinic, India reported 61.5% herpetic incidences while non-herpetic incidences were only 34.7% (Prabhakar *et al.*, 2012). Studies from other parts of India also revealed same patterns. The GUD herpetic cases were more than non-herpetic cases *i.e.* 62.83 against 22.12% (Bhavsar *et al.*, 2014) while one study reported opposite patterns where non-herpetic GUD outnumbered herpetic GUD cases *i.e.* 43.2% against 39.2% (Vora *et al.*, 2011). Similarly, 48.1% herpetic cases were reported from a STD clinic in Amsterdam, Netherlands while only 4.2% non-herpetic cases were reported (Bruisten *et al.*, 2001). Studies from Tanzania and Thailand also reveal the same pattern where the herpetic GUD cases are more than the non-herpetic GUDs (Mwansasu *et al.*, 2002; Beyrer *et al.*, 1998). Among all the non-herpetic cases, syphilis was found at a higher scale. These patterns clearly reveal that among GUDs, herpetic cases are predominant in comparison to non-herpetic cases.

In the present study, with the median age was 29, the highest incidences of GUD were reported from the age group of 21 – 30 years (20.38%) followed by 31 – 40 years (19.61%), 15 – 20 years (3.07%) and 41 – 50 years (1.92%). No one was found positive to any infection in the age group of above 50 years. In all the age groups, males outnumbered females. In a study from India with a median age of 31.7 years, herpetic GUD showed significant associations with a higher age- group (>25 years), having history of genital ulcers (Prabhakar *et al.*, 2012). In contrast, a study from Peru with a median age of 24, revealed that the individuals from age group 31 – 40 and above 40 were more prone to GUDs (46.3% HSV-2 and 13.4% syphilis positivity overall) than the other age groups (Lama *et al.*, 2006). In pregnant women of rural Tanzania, the prevalence of HSV-2 was more in the age group of >35 years (27.7%) and syphilis in the age group of 31 – 34 years (3.1%) (Malima *et al.*, 2008). However, in one of the studies, compared to the reference group (<25 years), older age was significantly less likely to show clinical GUD (for age group 25–34 years: aOR 0.48) and for age group ≥35 years: aOR 0.53) (Naveca *et al.*, 2013).

On the basis of occupation, in the present study, labourers were highly infected with GUD (10%) followed by employees of private sector (6.54%), farmers and drivers (5.38% each), employees of government sector (5%), house wives (4.62%), unemployed (3.85%), students (2.31%) and shopkeepers (1.92%). In these all categories, positivity for HSV serology was more observed (26.55%) followed by syphilis infection (12.31%) and HIV positivity (0.38%) in individual infections, while mixed infections altogether occurred only in 5.7% individuals. Only few studies are available which assess the connection of employment

status of an individual with GUD. In a study from Ethiopia, in the women attending ANC were found to have history of HSV-2 positivity of which interestingly 17.5% were house wives, 7.1% were shopkeepers, 4% were government employees and only 3.6% were labourers (Anjulo *et al.*, 2016). A study made on truck drivers of Kenya reported the incidence of GUD at a rate of 7.6% and HIV at a rate of 3% (Lavreys *et al.*, 1999). In a similar study made in India revealed the HIV incidences are more than syphilis cases in truck drivers (15.39% and 13.3% respectively) (Manjunath *et al.*, 2002). It is inferred that, truck drivers and their assistants are at increased risk of HIV infection and other STDs and being a mobile group they can spread the HIV infection to remote places.

In the present study, the pattern of sexual contact varied in different categories and many individuals were found to be having more than one type of sexual contact. A total of 30.77% individuals were having sexual contact with their spouses only, while 41.53%, 39.23% and 12.31% individuals were found to be having sex with known, female sex workers and unknown respectively. The history of males having sex with males (MSM) was also reported in 1.92% individuals. Interestingly in all these categories too, HSV-2 seropositivity was found in higher rates (28.24%) followed by syphilis seroreactivity and HIV seropositivity (15.78% and 0.29% respectively). Similar results were identified in a study from Gujarat, India where, males (38.20%) had exposure history to female sex workers (FSW) and known partners (23.60%) while maximum females (50%) had a history of contact with spouse only (Bhavsar *et al.*, 2014), suggesting marital sex as common mode of STD transmission in females. In MSM from Peru, HIV, HSV-2, and syphilis

seroprevalences of 13.9%, 46.3%, and 13.4% were detected, respectively. HSV-2 seroprevalence was twice as high in HIV-infected subjects (80.5%) than it was in HIV-uninfected subjects (Lama *et al.*, 2006). A study from Zambia revealed that the incidence of GUD in men who are in relation with spouse was reported at 4% while with known was reported at 5.5% while in females the rates were reported at 3.3% and 4.1% respectively (Makasa *et al.*, 2012). Like sampled GUD populations (74%) comparatively a large proportion of HSV infected GUD patients (92.3%) have had multiple sexual partners and HSV was more prevalent in sampled GUD populations having multiple sexual partners (Mamun *et al.*, 2010). In all countries of the Andean region (Venezuela, Colombia, Ecuador, Peru, and Bolivia), men who have sex with men (MSM) account for a substantial proportion of HIV infections and compose a “bridging group” for transmission to heterosexuals because of the high frequency of reported bisexuality among MSM (Lama *et al.*, 2006).

Many studies report the use of condoms in the transmission of HIV and correlation of HIV transmission with STIs. In a similar study from Peru, 37.6% occasional users were infected with HIV while 64.37% individuals never used condoms while having sex (Lama *et al.*, 2006). Consistent condom use was reported by only 15% of the individuals, among those whose partners were aware of the genetic ulcer, 16% reported consistent condom use versus 12% of those whose partners were unaware (Makasa *et al.*, 2012). In a study from Tanzania, only 4.9% women reported that they ever used condom while 95.1% never used condom. This study also reports that HSV-2 prevalence did not differ with a history of condom use (Malima *et al.*, 2008) (Table 4).

**Table.1** Serological profile of GUD patients

Gender	Only HSV-2 IgM ELISA Positive	Only RPR Reactive (TPHA positive)	Only HIV Positive	HSV-2 IgM ELISA Positive + RPR Reactive (TPHA positive)	HSV-2 IgM ELISA Positive + HIV Positive	RPR Reactive (TPHA positive)+ HIV Positive	HSV-2 IgM ELISA Positive + RPR Reactive (TPHA positive) + HIV Positive	Negative for all three tests	Total no. of patients
	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	
Male	56 (26.79)	27 (12.92)	01 (0.48)	02 (0.96)	03 (1.43)	06 (2.87)	01 (0.48)	113 (54.07)	209 (80.38)
Female	13 (25.50)	05 (9.80)	0	0	02 (3.92)	01 (1.96)	0	30 (58.82)	51 (19.62)
<b>Total</b>	<b>69</b> <b>(26.55)</b>	<b>32</b> <b>(12.31)</b>	<b>01</b> <b>(0.38)</b>	<b>02</b> <b>(0.77)</b>	<b>05</b> <b>(1.92)</b>	<b>07</b> <b>(2.69)</b>	<b>01</b> <b>(0.38)</b>	<b>143</b> <b>(55.00)</b>	<b>260</b>

**Table.2** Serological profile of GUD patients based on age

Age Group (years)	Only HSV-2 IgM ELISA Positive	Only RPR Reactive (TPHA positive)	Only HIV Positive	HSV-2 IgM ELISA Positive + RPR Reactive (TPHA positive)	HSV-2 IgM ELISA Positive + HIV Positive	RPR Reactive (TPHA positive)+ HIV Positive	HSV-2 IgM ELISA Positive + RPR Reactive (TPHA positive) + HIV Positive	Negative for all three tests	Total No. of Patients
	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	
15-20	05 (17.24)	03 (10.35)	0	0	0	0	0	21 (72.41)	29
21-30	31 (25.83)	18 (15.00)	0	01 (0.83)	02 (1.67)	01 (0.83)	0	67 (55.84)	120
31-40	30 (31.57)	10 (10.52)	01 (1.05)	01 (1.05)	03 (3.16)	06 (6.32)	0	44 (46.33)	95
41-50	03 (21.43)	01 (7.14)	0	0	0	0	01 (7.14)	09 (64.29)	14
>50	0	0	0	0	0	0	0	02 (100.00)	02
<b>Total</b>	<b>69</b> <b>(26.55)</b>	<b>32</b> <b>(12.31)</b>	<b>01</b> <b>(0.38)</b>	<b>02</b> <b>(0.77)</b>	<b>05</b> <b>(1.92)</b>	<b>07</b> <b>(2.69)</b>	<b>01</b> <b>(0.38)</b>	<b>143</b> <b>(55.00)</b>	260

**Table.3** Serological profile of GUD patients based on occupation

Occupation	Only HSV-2 IgM ELISA Positive	Only RPR Reactive (TPHA positive)	Only HIV Positive	HSV-2 IgM ELISA Positive + RPR Reactive (TPHA positive)	HSV-2 IgM ELISA Positive + HIV Positive	RPR Reactive (TPHA positive) + HIV Positive	HSV-2 IgM ELISA Positive + RPR Reactive (TPHA positive) + HIV Positive	Negative for all three tests	Total No. Of Patients
	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	
<b>Driver</b>	09 (32.15)	02 (7.14)	0	0	01 (3.57)	01 (3.57)	01 (3.57)	14 (50.00)	28
<b>Farmer</b>	11 (40.74)	03 (11.11)	0	0	0	0	0	13 (48.15)	27
<b>Govt. Sector</b>	07 (29.16)	04 (16.67)	0	0	01 (4.17)	01 (4.17)	0	11 (45.83)	24
<b>Labour</b>	13 (29.55)	09 (20.45)	01 (2.27)	0	01 (2.27)	02 (4.55)	0	18 (40.91)	44
<b>Private Sector</b>	10 (26.31)	05 (13.15)	0	01 (2.64)	0	01 (2.64)	0	21 (55.26)	38
<b>Shopkeeper</b>	03 (14.28)	02 (9.52)	0	0	0	0	0	16 (76.20)	21
<b>Student</b>	04 (15.39)	02 (7.69)	0	0	0	0	0	20 (76.92)	26
<b>Unemployed</b>	04 (20.00)	03 (15.00)	0	01 (5.00)	0	02 (10.00)	0	10 (50.00)	20
<b>House Wives</b>	08 (25.00)	02 (6.25)	0	0	02 (6.25)	0	0	20 (62.50)	32
<b>Total</b>	<b>69</b> <b>(26.55)</b>	<b>32</b> <b>(12.31)</b>	<b>01</b> <b>(0.38)</b>	<b>02</b> <b>(0.77)</b>	<b>05</b> <b>(1.92)</b>	<b>07</b> <b>(2.69)</b>	<b>01</b> <b>(0.38)</b>	<b>143</b> <b>(55.00)</b>	<b>260</b>



**Table.4** Serological profile of GUD patients based on condom usage

Pattern of Condom use	Only HSV-2 IgM ELISA Positive	Only RPR Reactive (TPHA positive)	Only HIV Positive	HSV-2 IgM ELISA Positive + RPR Reactive (TPHA positive)	HSV-2 IgM ELISA Positive + HIV Positive	RPR Reactive (TPHA positive) + HIV Positive	HSV-2 IgM ELISA Positive + RPR Reactive (TPHA positive) + HIV Positive	Negative for all three tests	Total No. of Patients
	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)		
<b>Regular user</b>	06 (26.09)	01 (4.35)	0	01 (4.35)	0	0	0	15 (65.22)	23
<b>Occasional user</b>	05 (15.15)	07 (21.21)	0	01 (3.03)	01 (3.03)	01 (3.03)	0	18 (54.55)	33
<b>Non user</b>	52 (28.26)	20 (10.9)	0	0	02 (1.09)	05 (2.72)	01 (0.54)	104 (56.52)	184
<b>History not received</b>	06 (30)	04 (20)	01 (5)	0	02 (10)	01 (5)	0	06 (30)	20
<b>Total</b>	<b>69 (26.54)</b>	<b>32 (12.32)</b>	<b>01 (0.38)</b>	<b>02 (0.77)</b>	<b>05 (1.92)</b>	<b>07 (2.69)</b>	<b>01 (0.38)</b>	<b>143 (55)</b>	<b>260</b>

**Table.5** Serological profile of female GUD patients based on BOH

History of BOH	Only HSV-2 IgM ELISA Positive	Only RPR Reactive (TPHA positive)	Only HIV Positive	HSV-2 IgM ELISA Positive + RPR Reactive (TPHA positive)	HSV-2 IgM ELISA Positive + HIV Positive	RPR Reactive (TPHA positive) + HIV Positive	HSV-2 IgM ELISA Positive + RPR Reactive (TPHA positive) + HIV Positive	Negative for all three tests	Total No. of Patients
	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)		
<b>Yes</b>	06 (33.33)	03 (16.67)	0	0	02 (11.11)	01 (5.56)	0	06 (33.33)	18
<b>No</b>	04 (17.39)	02 (8.7)	0	0	0	0	0	17 (73.91)	23
<b>History not received</b>	01 (25)	0	0	0	0	0	0	03 (75)	04
<b>Total</b>	<b>11 (24.44)</b>	<b>05 (11.11)</b>	<b>0</b>	<b>0</b>	<b>02 (4.44)</b>	<b>01 (2.22)</b>	<b>0</b>	<b>26 (57.79)</b>	<b>45</b>

Heterosexual transmission is the major mode of HIV transmission in India with most married women living with HIV having acquired it from their spouses. Being married and monogamous was another factor of failure to sustain consistent condom use behavior among these men who were attending STI clinics in India. A large study in Britain also reported that 80% of sexually active, never married respondents used condoms 'to protect against HIV and other STI' in contrast to 1.8% of married respondents (Sahay *et al.*, 2015). Use of condom with regular and non regular partners was 19.5% and 42.1%, respectively. Most of the subjects (52.2%) reported having sex with a regular partner, while 30% had sex with non regular partners and 7.8% reported having sex with sex worker (Muralidhar *et al.*, 2013). Men having extramarital and multi-partner sex are exposed to risk of acquiring HIV and STI. Men tend to use condoms during commercial sex, but this behavior is inconsistent. Condoms are also often regarded as irrelevant in long-term relationships due to lack of perception of risk among monogamous married men who prefer not to use condoms consistently with their regular partners. Heterosexual transmission is the major mode of HIV transmission in India with most married women living with HIV having acquired it from their spouses (Sahay *et al.*, 2015).

In the present study among the 45 married women, 51.1% were not having any Bad Obstetric History (BOH) while 40% were having BOH. Of these 45, GUDs were reported in 26.67%, 13.33% women who were having BOH and not having BOH respectively. Among the GUDs, herpetic infections (26.66%) outnumbered non-herpetic infections (13.33%). In a similar study from Delhi, a total of 15.18% were reported to be having a BOH, of which GUD was reported in only 0.88% women. Among

these, the incidences of GUD was reported as HSV-2 (11.6%), VDRL and TPHA positivity (2.1%); HIV seropositivity (0.3%) (Ray *et al.*, 2009). In another study from Punjab, India revealed prevalence of genital ulcers in housewives was reported at 34.1% of which prevalence in BOH was 2.27% (Aggarwal and Kaur, 2004). Similar study from Mumbai reported In another study from Iran, out of 380 pregnant women with BOH, a total of 3.6% were positive for HSV-2 (Turbadkar *et al.*, 2003). However, studies made state that among women with recurrent genital HSV, nearly 75% can expect at least one recurrence during pregnancy, and approximately 14% of patients will have prodromal symptoms or clinical recurrence at delivery. HSV infection does not appear to be associated with an increased risk for spontaneous abortion (Aga and Hollier, 2009). In the present study, HSV-2 was high among pregnant women whose age were greater than or equal to 18 years at first pregnancy, mother having "no birth-2" children, gestational weeks between 20 and 28 weeks, women who had no history of abortion and used contraceptive which accounts 54(66.6%), 38(46.9%), 44(54.3%), 71(87.6%) and 59(72.8 %) respectively (Anjulo *et al.*, 2016).

To conclude, herpetic cases predominate the non herpetic cases in GUDs; males are more infected than females. HSV-2 infection is the major infective agent in GUD cases. In non-herpetic cases, syphilis was more predominant. Incidences of HIV were more in mixed infections, further conferring those STIs, specifically GUDs can play a major role in HIV infection and / or transmission. The study also reveals that condom users are less prone to GUDs and HIV infections than non-users, thus emphasises the usage of condoms while having safe sex. Females with history of GUDs are more prone to BOH. Hence there is an urgent need to spread awareness in general public about the STD's, their

complications, diagnosis and treatment. This can be done through Non Governmental Organizations, social workers, print/electronic media.

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