

# Study of Seroprevalence of HSV Infection at Government General Hospital, Kakinada

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**Running Title:** Study of Seroprevalence of HSV infection at Government General Hospital, Kakinada.

**Abstract:** **Aims and Objectives:** To study the seroprevalence of HSV infection in patients attending STI clinic, Government General Hospital, Kakinada and to note the association of HSV seropositivity with HIV infection and other risk factors. **Material and Methods:** 82 consecutive STI clinic attendees of both sexes of 15-70 years with STI complaints were included in this study. Serum samples were screened for HSV-1 and HSV-2 type specific IgM and IgG antibodies by ELISA-Euroimmune Kits. **Results:** Out of 82 patients, 42 females and 40 males, 39 had genital herpes (including 5 cervicitis) and 43 had other STDs like genital candidiasis, non specific urethritis, condyloma acuminata, molluscum contagiosum and erectile dysfunction. Two were seropositive for HSV-1 IgM, 68 (82.9%) for HSV-1 IgG, 4 for HSV-2 IgM and 40(48.8%) for HSV-2 IgG. 12 Tzanck smears were positive. All were RPR nonreactive. **Discussion:** HSV-1 and HSV-2 seropositivity was high in uneducated, urban low socioeconomic people. HSV-2 seroprevalence was 53.8% of genital herpes, with high incidence in high risk groups. Therefore, HSV-2 antibody can serve as serologic marker for sexual behaviour. HSV-2 IgG positivity and HIV had significant p-value of <0.001 suggesting disruption of mucocutaneous barrier by HSV allows HIV and other STDs. In those with other STDs, 44.2% subclinical HSV infections were detected. As sexual and vertical transmission occur during asymptomatic viral shedding, premarital testing of HSV is necessary to have a healthy offspring. All STI clinic attendants need serological screening for HSV, HIV, RPR, HBs Ag and other related STD pathogens

**Keywords:** HSV1 Ig G, HSV 1 IgM, HSV 2 IgG, HSV2 IgM

## 1. Introduction

Herpes simplex virus infections are caused by Herpes simplex virus Type-1(HSV-1) and type-2 (HSV-2). HSV-1 causes orolabial disease. Genital herpes may be caused by either HSV-2 or HSV-1, large majority of cases being caused by HSV-2. HSV-1 is acquired during early childhood by most of the individuals. The acquisition of HSV-2 starts around puberty or thereafter.

Prevalence of HSV infection varies not only between developed and developing nations but also in different areas of a nation depending on social, cultural and behavioural practices. Prevalence of HSV antibodies increases with age, correlates inversely with socioeconomic status,<sup>104-109</sup> higher in persons recruited from STD clinics and in MSM. It is also related to number of sexual partners, age of sexual debut and history of other STDs. HSV-2 antibody can serve as a sero marker for sexual behaviour in different populations<sup>37</sup>. Hence the present study is taken up to know the seroprevalence of HSV antibodies in STD clinic attendees in our hospital and to assess the various epidemiological and other risk factors like HIV associated with HSV seropositivity.

## 2. Aims and Objectives:

- 1)To study the Seroprevalence of Herpes simplex virus infection in patients attending the STI clinic.
- 2)To study the risk factors and other socioepidemiological factors associated with HSV-2 seropositivity.

- 3)To study the seroprevalence of HSV infection in HIV positive individuals.
- 4)To study the proportion of subclinical seropositives for HSV infection.

## 3. Methodology

A total of 82 patients, 40 (49%) males and 42 (51%) females are included in the present study. Out of 82, 3(3.6%) patients are between 11-20 years , 26(31.7%) patients are between 21-30 years , 34 (41.4%) patients are in the age group of 31-40 years , 13(16%) patients are between 41-50 years , 5(6%) between 51-60 years and 1(1.2%) between 61-70 years.

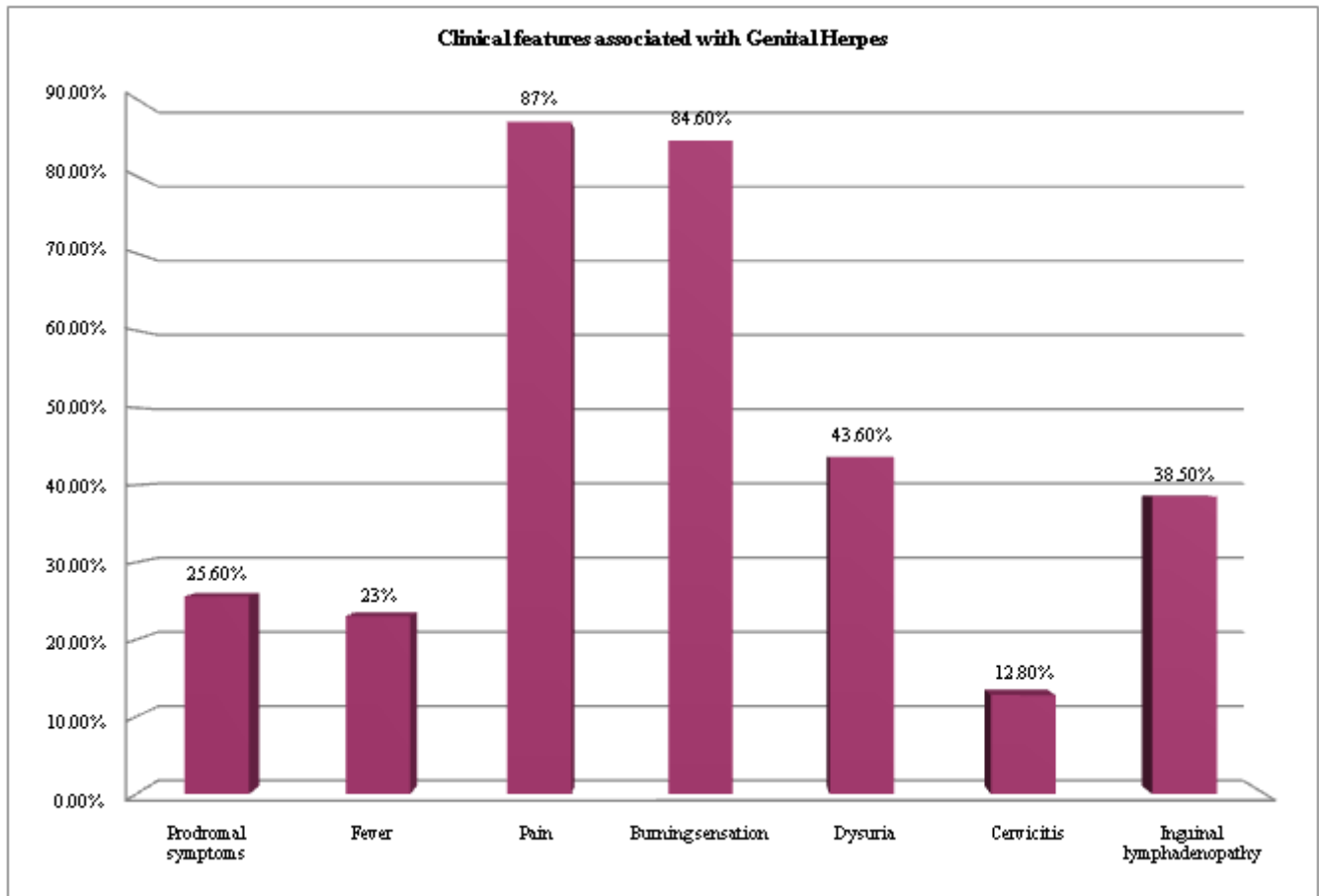
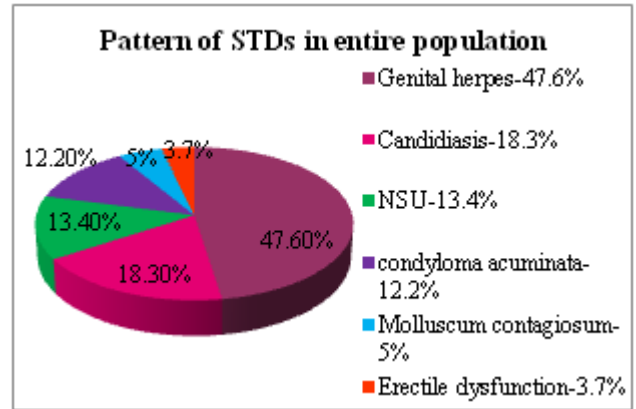
Out of 82 patients , 56 (68.3%) patients are from rural areas and 26 (31.7%) are from urban areas. Of the 82 patients in our study 58 (70.7%) patients belonged to low socioeconomic status and 24 (29.3%) belonged to middle class.

Of the 82 patients in our study 25(30.5%) patients are educated and 57 (69.5%) patients are uneducated. Out of 82, 60(73.2%) patients are married, 10(12.2%) are unmarried and the remaining 12(14.6%) patients are either widowed or divorced. Of the 82 patients, 40 (48.8%) labourers, 19 (23.2%) housewives, 5 (6.1%) businessmen , 6 (7.3%) students , 2 (2.4%) commercial sex workers, 3 (3.7%) truck drivers and 7 (8.5%) patients with other occupations are included.

Of the 82 patients in the present study 41(50%) HIV positive and 41(50%) are HIV negative. Of the 82 patients examined in the present study, 39 (47.6%) were clinically diagnosed of

Genital herpes. There are 43 patients with other STDs which include 15 (18.3%) patients with genital candidiasis, 11 (13.4%) patients with non specific urethritis, 10 (12.2%) patients with condyloma acuminata, 4 (5%) with genital molluscum contagiosum and 3(3.7%) with erectile dysfunction.

Of the 39 patients with genital herpes, 34 (87%) patients complained of pain, 33 (84.6%) patients complained of burning sensation, and 17 (43.6%) patients complained of dysuria. Prodromal symptoms were present in 10 (25.6%) patients. On examination, 15(38.5%) patients had inguinal lymphadenopathy and 5 (26.3%) females had cervicitis.



Of the 82 patients included in our study 2 (2.4%) patients were positive for were HSV-1 IgM antibodies. 68(82.9%) patients were positive for were HSV-1 IgG antibodies . Among them 2(2.4%) are positive for both HSV-1 IgM & HSV-1 IgG antibodies.

4 (5%) patients were positive for were HSV-2 IgM antibodies and

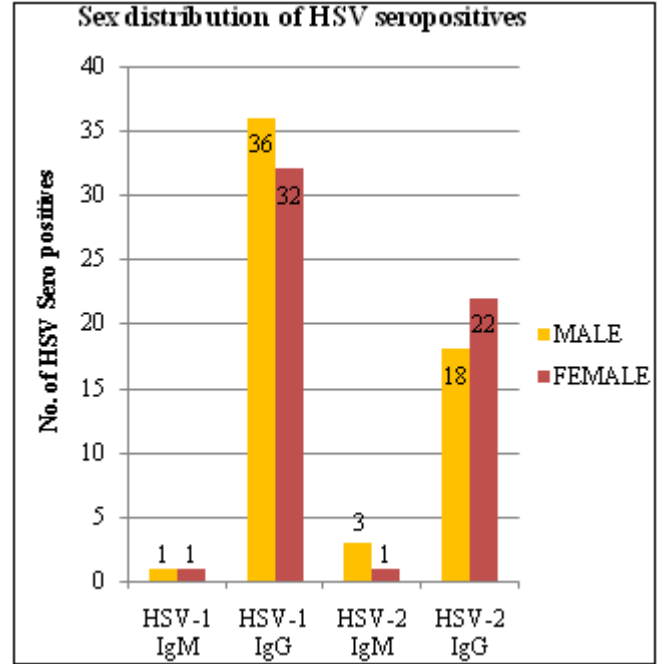
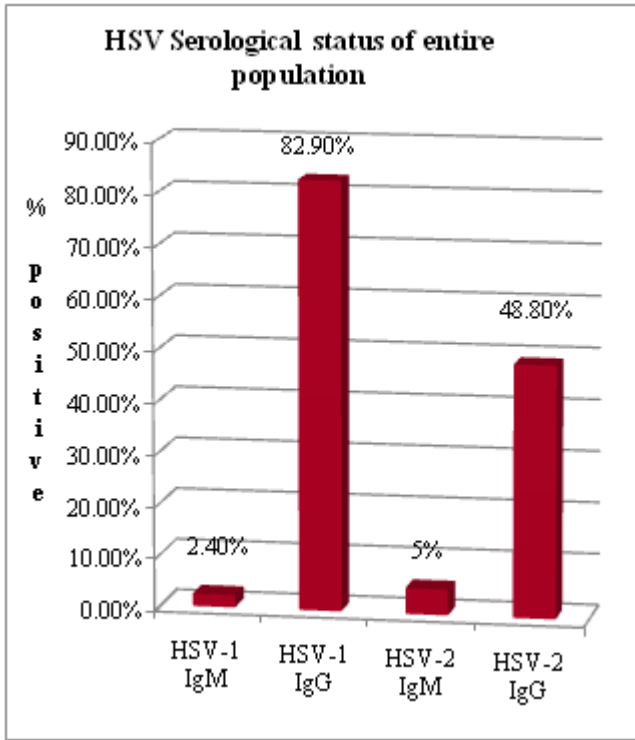
40 (48.8%) patients were positive for were HSV-2 IgG antibodies.

Among them 4(5%) are positive for both HSV-2 IgM & HSV-2 IgG antibodies.

1(1%) male and 1(3.2%) female patient have HSV-1 IgM antibodies .

36(90%) males and 32(76.2%) females are seropositive for HSV-1 IgG.

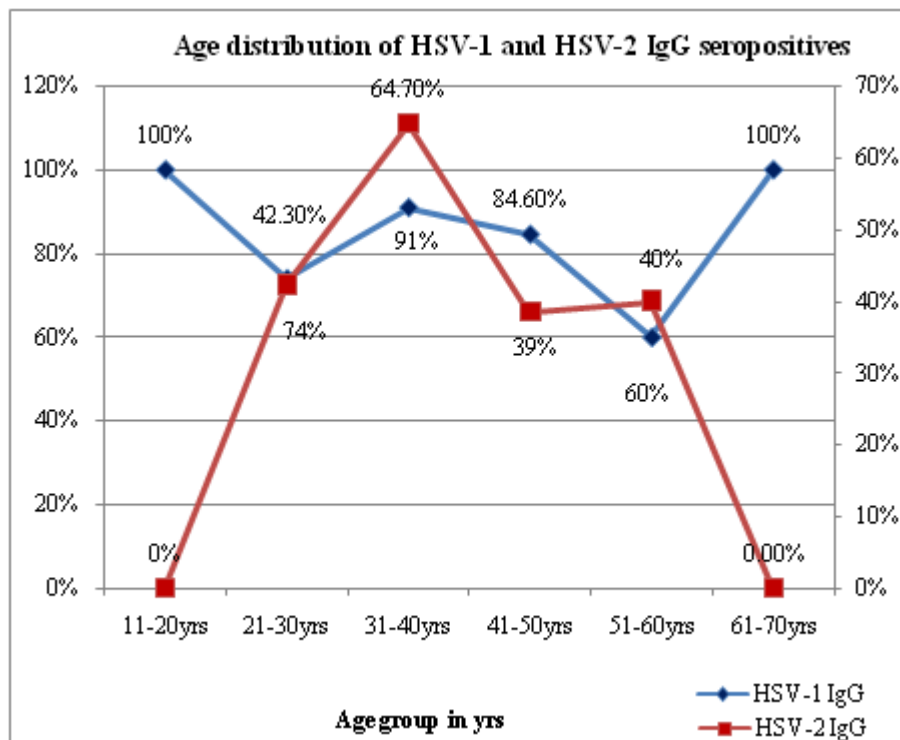
3(7.5%) males and 1(2.4%) female patient have HSV-2 IgM antibodies



3 (100%) out of 3 patients in the age group of 11-20 years, 20 (74%) out of 27 between 21-30 years, 11 (84.6%) out of 13 between 31-40 years, 3 (60%) out of 5 between 41-50 years and 1 (100%) out of 1 in the age group of 61-70 years patients were seropositive for HSV-1 IgG antibodies.

11 (42.3%) out of 26 between 21-30 years, 22 (64.7%) out of 34 between 31-40 years, 5 (38.5%) out of 13 between 41-50 years and 2 (40%) out of 5 patients between 51-60 years were seropositive for HSV-1 IgG antibodies. Of the 3 patients between 11-20 years and 1 patient between 61-70 years none were seropositive for HSV-2 IgG.

18 (45%) males and 22 (52.4%) females are seropositive for HSV-2 IgG



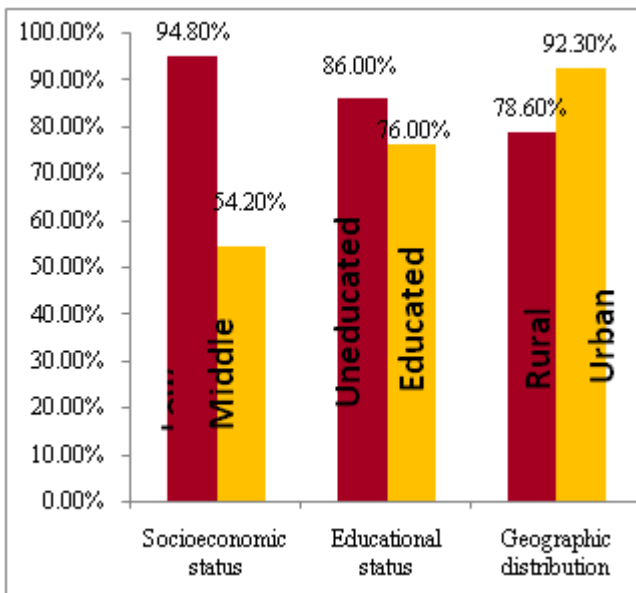
55 (94.8%) out of 58 patients of low socioeconomic class and 13 (54.2%) out of 24 of middle class are positive for HSV-1 IgG antibodies. The association of HSV-1 IgG positivity with low socioeconomic status is statistically significant in our study with a p value =0. ( $\chi^2$  value = 19.823, degrees of freedom=1)

44 (78.6%) out of 56 patients of rural population and 24 (92.3%) out of 26 patients of urban population are positive for HSV-1 IgG antibodies. Seropositivity is higher in urban population than rural population. HSV-2 IgG seropositivity is seen 25 (44.6%) out of 56 patients of urban areas and in 15 (57.7%) out of 26 patients of the rural areas.

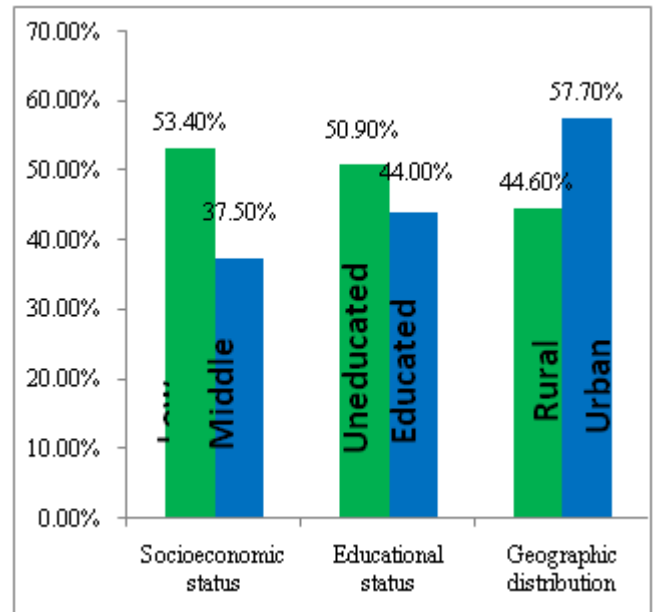
19 (76%) out of 25 educated patients and 49 (86%) out of 57 uneducated patients were HSV-1 IgG seropositive.

HSV-2 seropositivity is seen in 11(44%) out of 25 educated patients and in 29 (50.9%) out of 57 among the uneducated patients

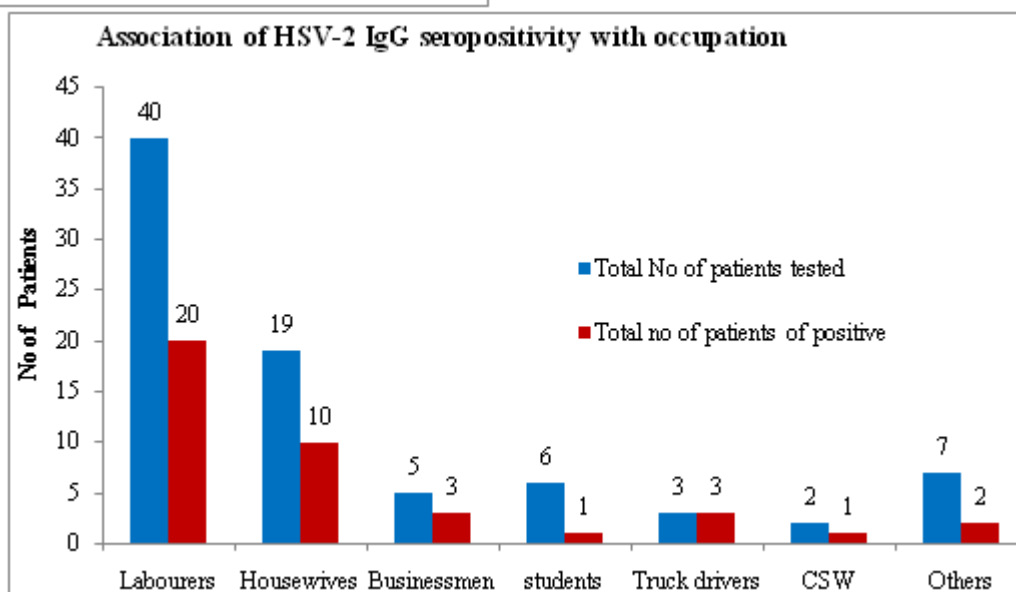
Association of HSV-1 seropositivity with epidemiological features



Association of HSV-2 seropositivity with epidemiological features



In our study 3 out of 3(100%) of truck drivers, 3 among 5( 60%) businessmen, 10 among 19 (52.6%) housewives, 20 among 40( 50%) labourers , 1 of the 2(50%) commercial sex workers and 1 among 6 ( 16.7%) students had HSV-2 antibodies.

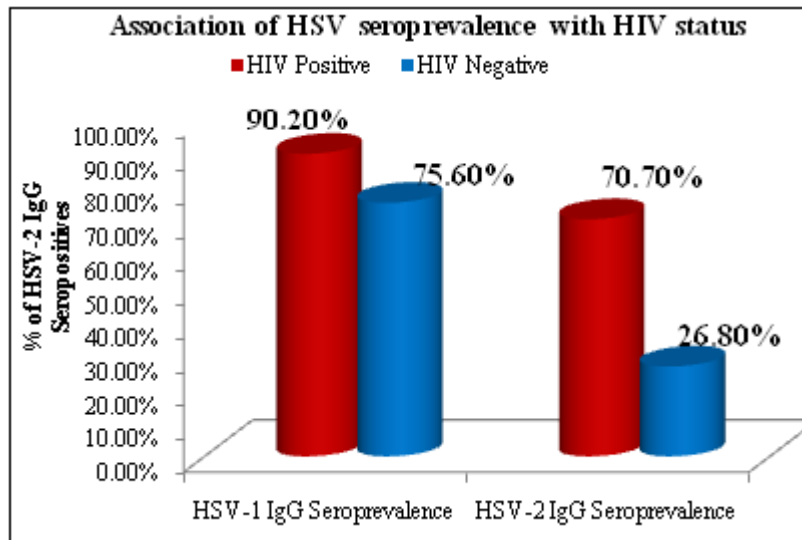


In our study 30 out of 60 (50%) married individuals, 2 out of 10 (20%) unmarried and 8 out of 12 (66.7%) widowed/divorced individuals were HSV-2 antibody positive. Seropositivity was high in widowed/divorced individuals

24 out of 37 (65%) patients with multiple partners had HSV-2 IgG antibodies while only 16 out of 45 (35.6%) with single partners had HSV-2 antibodies. The association of HSV-2 seropositivity with multiple partners is statistically

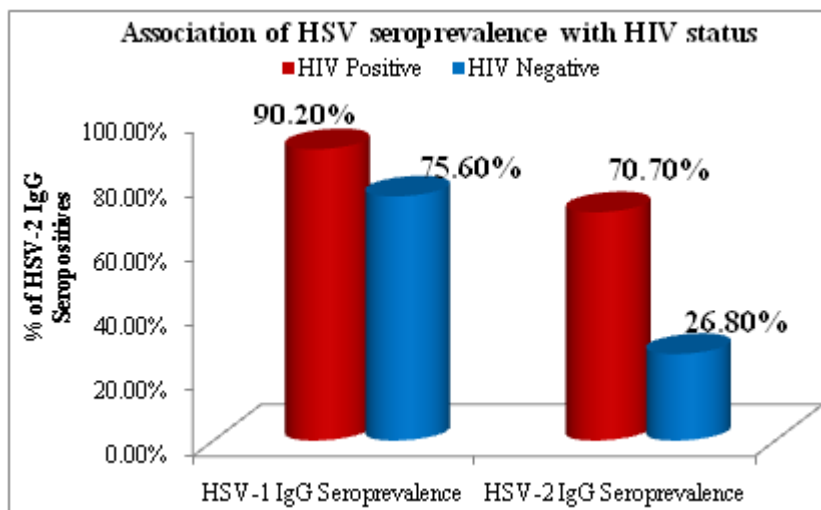
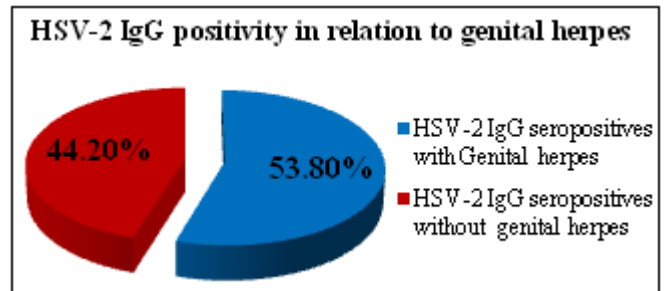
significant with a p value = 0.008 ( $\chi^2 = 6.981$ , degree of freedom = 1).

HSV-2 seropositivity is high in HIV positive patients (70.7%) than in the HIV negative patients (26.8%). The association of HSV-2 seropositivity with HIV infection is statistically significant with p value = 0. (Chisquare value = 15.814, degree of freedom = 1)  
 37 out of 41 (90.2%) HIV positive patients and 31 out of 41 (5.6%) of the HIV negative patients are seropositive for HSV-1 IgG.



In 39 patients with genital herpes 21 (53.8%) are seropositive for HSV-2 IgG (73.7% of HIV positive and 35% of HIV negative patients).

In 43 patients without genital herpes 19 (44.2%) are seropositive for HSV-2 IgG (68% of HIV positive and 19% of HIV negative patients) indicating subclinical infection.



In 39 patients with genital herpes 21(53.8%) are seropositive for HSV-2 IgG (73.7% of HIV positive and 35% of HIV negative patients).

In 43 patients without genital herpes 19(44.2%) are seropositive for HSV-2 IgG (68% of HIV positive and 19% of HIV negative patients) indicating subclinical infection.

Of the 43 patients with other STDs without genital herpes, HSV-2 IgG seropositivity was seen in 19(44.2%) individuals. Among them 7 out of 11 (63.6%) patients with non-specific urethritis, 3 out of 4(75%) with genital molluscum contagiosum, 4 out of 10(40%) with condyloma acuminata and 5 out of 15 (3.3%) with genital candidiasis were positive for HSV-2 IgG antibodies.

In the present study, the serological profile of HSV infection in patients attending STI clinic and the association of seropositivity with HIV infection and other risk factors is noted. 82 consecutive STI clinic attendees of both sexes in the age group of 15-70 years were studied. Patients with genital herpes as well as patients with other STI complaints including both HIV positive and HIV negative patients were included in the study. Patients without STI complaints were excluded from the study. Samples from all patients were screened for HSV-1 and HSV-2 type specific IgM and IgG antibodies by ELISA.

Of the 82 patients in the present study, there are 40(49%) male and 42 (51%) female patients. Most of the patients are in the age groups of 21-30yrs(33%) and 31-40yrs(40.2%). 41 patients (50%) are HIV positive and 41 (50%) patients are HIV negative. 58 (70.7%) patients were from low socioeconomic status and 56 (68.3%) were rural residents. Out of 82 patients, 32(80%) males and 28(66.7%) females were married and 37(45%) patients had multiple partners. All patients were heterosexual. Of the 82 patients, 39(47.6%) had genital herpes and there are 43 patients with other STDs which include 15(18.3%) patients with genital candidiasis, 11 (13.4%) patients with non specific urethritis, 10 (12.2%) patients with condyloma acuminata, 4(5%) patients with genital molluscum contagiosum and 3(3.7%) with erectile dysfunction.

Of the 39 patients with genital herpes, 11(28.2%) gave history of recurrent herpes genitalis. Of the 39 patients with genital herpes, 34 (87%) patients complained of pain, 33 (84.6%) patients complained of burning sensation, and 17 (43.6%) patients complained of dysuria. Prodromal symptoms were present in 10 (25.6%). On examination, 15(38.5%) patients had inguinal lymphadenopathy and 5 (26.3%) females had cervicitis. Tzanck smear was positive in 12 (30.8%) patients only. All patients were screened for syphilis with RPR and none were reactive.

#### *Serological profile of HSV-1 antibodies:*

Serological survey of STD clinic attendees in our hospital revealed that out of 82 patients, 2(2.4%) patients were positive for HSV-1 IgM antibodies while in a study by Subha PriyaVenkateshwaran et al<sup>137</sup> in Tamilnadu, 34.3% HSV-1 IgM positivity was seen. HSV-1 IgG antibodies were positive in 68 (82.9%) patients in our study almost similar to 71.4% HSV-1 IgG positivity in a study by Subha Priya

Venkateshwaran et al<sup>137</sup> in Tamilnadu. In a study by K.N. Shivaswamy et al<sup>161</sup> 91.5% of STI clinic attendees were positive for HSV-1 IgG. Similar studies by P.N.Levett et al<sup>136</sup> and Rezaei et al<sup>141</sup> showed varied results of 89% & 58.4% of HSV-1 IgG seropositivity. In STD clinics in United states, about 60% attendees have HSV-1 antibodies.<sup>117</sup>

Prevalence of antibodies to HSV increases with age<sup>12,22-26</sup>. In Asia and Africa HSV-1 infection remains almost universal with infection acquired in early childhood<sup>32</sup>. Such high levels of HSV-1 acquisition in developing countries probably reflect extensive salivary spread in poorer hygienic conditions<sup>158</sup>. In our study 3(100%) patients in the age group of 11-20years, 20 (74%) between 21-30 years, 11 (84.6%) between 31-40 years, 3 (60%) between 41-50 years and 1 (100%) patient in the age group of 61-70 years were seropositive for HSV-1 IgG antibodies.

In the present study HSV-1 IgG was more in males than in females. 36 (90%) out of 40 males and 32(76.2%) out of 42 females were positive for HSV-IgG. But in a study by Michelle Howard et al<sup>139</sup> HSV-1 IgG antibodies were higher in females.

Prevalence of antibodies to HSV correlates inversely to socioeconomic status<sup>104-109</sup>. Serosurveys of western population in post worldwar II era found 80-100% of middle aged adults of low socioeconomic status had antibodies to HSV as compared with 30-50% of adults of high socioeconomic status. In our study 55(94.8%) out of 58 patients of low socioeconomic status had HSV-1 IgG antibodies as compared to 13 (54.2%) out of 24 patients of the high socioeconomic status showing statistical association of HSV-1 positivity with low socioeconomic status ( $p<0.001$ ). In our STD clinic attendees 44 (78.6%) out of 56 of rural population showed HSV-1 IgG antibodies as compared to 24 out of 26 (92.3%) of urban population. HSV-1 IgG seropositivity is higher in uneducated (86%) than in educated (76%) individuals.

Unlike HSV-2, HSV-1 infection does not appear to increase the risk of HIV acquisition. However, most persons who acquire HIV have prior HSV-1 infection, making it difficult to observe HIV acquisition in HSV seronegative persons<sup>117</sup>. HSV-1 reactivation in the genital tract is infrequent, perhaps also accounting for its lack of association with HIV acquisition<sup>117</sup>. In our study, of the 41 HIV positive individuals 2 patients (5%) had HSV-1 IgM antibodies and 37 patients (90.24%) had HSV-1 IgG antibodies while 31 out of 41 (75.6%) of HIV negative individuals had HSV-1 IgG positivity, showing no significant statistical association with HIV infection. These observations were almost similar to the observations made by Subha PriyaVenkateshwaran et al<sup>137</sup> in which the seroprevalence of HSV-1 IgG antibodies in HIV-1 positives was 80%, while that in HIV negatives it was 71.4%. These findings are also similar to a study by P.N.Levett et al<sup>136</sup> who studied the seroprevalence of HSV-1 in a small Caribbean island in Barbados in 2004 where the seroprevalence of HSV-1 IgG was 89% in HIV infected group.

#### *Serological profile of HSV-2 antibodies:*

The frequency of HSV-2 antibody is higher among persons recruited from STD clinics.<sup>43,44</sup> Serological survey of STD clinic attendees in our hospital revealed that out of 82, 4(5%) patients were positive for HSV-2 IgM. In a study by Subha Priya Venkateshwaranetal<sup>137</sup> in Tamilnadu 38.6% HSV-2 IgM positivity was observed.

HSV-2 IgG antibodies were positive in 40 (48.8% ) patients in our study almost similar to 38.6% HSV-2 IgG positivity in a study by Subha PriyaVenkateshwaran etal<sup>137</sup> in Tamilnadu. [Cunningham AL](#) etal<sup>138</sup> showed 40% seropositivity in STD clinic attendees and in a study by P.N.Levettetal<sup>136</sup> 77% of HSV-2 IgG seropositivity was seen. In a study by Jose A Valera etal<sup>143</sup> 25% and in a study by Darayoush Tayyebi etal<sup>142</sup> 23.3% HSV-2 seropositivity was seen.

Prevalence of antibodies to HSV increases with age<sup>104-109</sup>. Antibodies to HSV-2 are not routinely detected in sera until puberty, and antibody prevalence rates correlate with indices of sexual activity<sup>117</sup>. In our study highest prevalence of HSV-2 IgG was seen in the sexually active age group . 22 out of 34 (66.7%) in the age group of 31-40yrs , and 11 out of 26 (42.3%) in the age group of 21-30yrs were positive for HSV-2 IgG in our study. In our study, the seropostivity for HSV-2 was more in middle aged adults than in other age groups in contrast to the observations made in other similar studies by R G Pebody etal<sup>140</sup> and Subha Priya Venkateshwaranetal<sup>137</sup> where the seropositivity increased with increasing age.

Consistently, HSV-2 seroprevalence is higher among women than men. In the present study out of 82, 40 males and 42 females were assessed and it is observed that 22 (52.3%) females and 18(45%) males are seropositive for HSV-2 IgG indicating a slightly higher seropositivity in females similar to the findings of Douglas T Flemming etal<sup>156</sup> (25.6% among women and 17.8 % among men), Jose A Valera etal<sup>143</sup> (30% of women and 12% men), Auvert B etal<sup>157</sup> ( 53.3% in women and 17% in Men), Weiss HA etal<sup>155</sup>(50% in women and 25% in men), Daryoush Tayyebi etal<sup>142</sup>( 29% in women 17.5% in men) . The reasons for the higher prevalence among women are unclear. One possible reason that occurs with sexually transmitted infections is the anatomical difference between women and men and women may be more susceptible to infection<sup>134</sup>. Differences in the distribution of sexual risk behaviours between men and women may also be a contributing factor.

Prevalence of antibodies to HSV correlates inversely to socioeconomic status<sup>104-109</sup>. In our study 31 (53.4%) patients of low socioeconomic status had HSV-2 IgG antibodies as compared to 9 (37.5)% in the middle class . In our STD clinic attendees 25 (44.6%) patients of rural population showed HSV-2 IgG antibodies as compared to 15(57.7%) of urban population. HSV-2 seropositivity is 50.9% among the educated patients and 44% in the uneducated.

HSV-2 seropostivity in relation to occupation was studied. In our study 3 out of 3(100%) of truck drivers, 3 among 5( 60%) businessmen, 10 among 19 (52.6%) housewives, 20 among 40( 50%) labourers , 1 of the 2 (50%) commercial

sex workers and 1 among 6 ( 16.7%) students had HSV-2 antibodies.

In our study 30 (50%) out of 60 married individuals, 2(20%) out of 10 unmarried and 8 (66.7%) out of 12 widowed/divorced individuals were HSV-2 antibody positive. Seropositivity was high in widowed/divorced individuals. In a study by K.N.Shivaswamy etal<sup>161</sup> 87% of married and 80.6% of unmarried HIV negative individuals had HSV-2 antibodies.

In both general population and high-risk groups, HSV-2 antibody is closely related to the lifetime number of sexual partners. As such, it can serve as a serologic marker for sexual behavior in different populations<sup>168</sup>. An attempt was made in the present study to assess the association of HSV-2 IgG seropositivity with the number of sexual partners. We observed that 24 (65%) out of 37 patients with multiple partners had HSV-2 IgG antibodies while only 16 (35.6%) out of 45 patients with single partners had HSV-2 antibodies. This association is statistically significant with a p-value of 0.008. Rathore S etal<sup>135</sup> found a similar positive association of HSV-2 seropositivity with multiple partners . In their study during 2008-09 they observed 30% seropositives had multiple partners and 6.32% seropositives had single partners.

HSV-2 infection rates are also higher among people with HIV infection . HSV-2 is among the most common infection in HIV seropositive persons, as about 70% of HIV-infected persons in the developed world and 95% in the developing world have HSV-2 antibody<sup>117</sup>. Recent studies of genital HSV-2 reactivation have shown that the risk of viral shedding is increased among HIV infected persons, especially the risk of subclinical shedding<sup>117</sup> .

In our study 29( 70.7%) out of 41 HIV positive individuals had HSV-2 IgG antibodies while only 11(26.8%) out of 41 HIV negative individuals had HSV-2 IgG antibodies. The association of HSV-2 IgG positivity and HIV infection in our study is statistically significant with a p-value of <0.001. Our results are comparable to a recent study conducted in our hospital in department of Microbiology which showed 63.63% HSV-2 seropositivity in 132 HIV positive patients. The findings in our study are almost similar to a study by P.N.Levett etal<sup>136</sup> who studied the seroprevalence of HSV-2 in a small caribbean island in Barbados in 2004 where the seroprevalence of HSV-2 IgG is 77% in the HIV infected group. These observations are similar to Russel D B etal<sup>152</sup> and Subha Priya Venkateshwaran etal<sup>137</sup> in which 61% and 60% of HIV positives had antibodies to HSV-2 respectively. In a study by K.Anuradha etal<sup>160</sup> in Viaakhapatnam 49% HSV-2 seropositivity was seen in HIV positive individuals.

In our study 26.8% of HIV negative individuals had HSV-2 IgG antibodies. In a recent study conducted at department of Microbiology in our hospital the percentage of HSV-2 IgG seropositivity in 50 HIV negative voluntary blood donors was 6% . In another study conducted in our hospital , HSV-2 seropositivity in HIV negative antenatal women was 6.6%.In a study by Subha Priya Venkateshwaran etal<sup>137</sup> 17.1% of HIV negative individuals had HSV-2 antibodies.

There is a wide disparity of seroprevalence of HSV-2 among the HIV positive and negative populations with a high prevalence in HIV positives in our study, supported by several previous studies as well. This signifies that the burden of HSV-2 seropositivity is clearly associated with HIV individuals and the present study further strengthens this association.

In the present study, of the 43 patients with other STDs without genital herpes, HSV-2 IgG seropositivity was seen in 19(44.2%) individuals. Among them 7 (63.6%) out of 11 patients with non-specific urethritis, 3(75%) out of 4 with genital molluscum contagiosum, 4(40%) out of 10 with condyloma acuminata and 5 (33.3%) out of 15 with genital candidiasis were positive for HSV-2 IgG antibodies.

In the present study, of the 39 patients with genital herpes 21(53.8%) are seropositive for HSV-2 IgG. In a study by Rezaei et al<sup>141</sup> in Iran, 73.9% with genital herpes were seropositive and in another study by Jose A Valera et al<sup>143</sup> in Spain, 30% of the HSV-2 seropositives had history of herpes. K.N.Shivaswamy et al<sup>161</sup> reported 55.2% seropositivity in patients with genital herpes, in their study in STI clinic attendees.

The predominant cause of genital ulcers worldwide is HSV-2, accounting for 40–80% of diagnosed etiologies of genital ulcers. 25% of genital ulcers continue to be undiagnosed<sup>67,68,73</sup>. Seroepidemiologic studies have shown a wide disparity between antibody prevalence and clinical infections, indicating that many persons acquire subclinical infection<sup>12,57</sup>. Reasons for lack of recognition of the infection include mild disease in most persons, attenuation of symptoms in those with prior HSV-1 infection, location of lesions in difficult-to-examine areas, e.g., perianal region, and differential access to health care and availability of diagnostics in various populations.<sup>117</sup>

In our STD clinic attendees 19 (44.2%) out of 43 patients with other STIs who did not give history suggestive of genital herpes were positive for HSV-2 serology, indicating subclinical infection. Studies by Jose A.Varela et al<sup>143</sup> and Marco Cusini et al<sup>144</sup> showed a much higher proportion of subclinical HSV-2 seropositivity in HIV negative Spanish and Italian populations which was 70% and 86.7% respectively. In a study by K.N.Shivaswamy et al<sup>161</sup> 72.6% of HIV negative patients who did not give history suggestive of genital herpes were positive for HSV-2 serology. In a study by Jayakumar Williams et al<sup>116</sup> in India, 75% of the HSV-2 seropositives did not have genital herpes. Thus our results are consistent with several studies reporting that the majority of persons infected with HSV-2 do not have symptoms of genital herpes<sup>119,120-122</sup> and that symptom-free patients probably represent the major reservoir for HSV-2 transmission.<sup>118</sup>

#### 4. Conclusions

From our study we conclude that Herpes simplex virus infection is common in STI clinic attendees in our hospital. Prevalence of HSV-1 and HSV-2 serum antibodies provide an epidemiological measure of population burden of these infections.

In developing countries where facilities for viral culture, or Nucleic acid amplification tests are not available and more expensive, testing for HSV antibodies is a useful approach to detect those subclinically infected or to screen high risk groups like HIV positives.

Potential uses of HSV-2 serology include assessment of asymptomatic partners of patients with genital herpes transmitting infection subclinically, routine screening for STDs, diagnosis of genital ulcers where viral culture repeatedly gives negative results and exclusion of infection in pregnant women with subclinical shedding at risk of transmitting infection to the neonate. The high seroprevalence of HSV-2 in HIV patients potentiates the need for regular HSV-2 screening in HIV positive individuals and proper counselling and treatment of HSV-2 seropositives during outbreaks will efficiently lower the frequency of recurrences and decrease the transmission of both HSV and HIV infections. The role of antiviral suppressive therapy in reducing viral shedding and transmission of infection in HSV-2 seropositive HIV individuals needs to be assessed. It is important that there is an accurate estimate of HSV-1 seroprevalence in adolescent and adult populations, in preparing for potential deployment of HSV vaccine as efficacy has only been demonstrated in women with no previous antibodies to HSV-1 or HSV-2.

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