

## Seroprevalence of Herpes simplex virus 1 & 2 in high risk behavior individuals in a tertiary care centre

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### Abstract :

Asian data about herpes simplex virus ( HSV )seroprevalence is sparse and often lower prevalence of the same has been reported especially of HSV-2.

**Objectives :** To ascertain seroprevalence of HSV-1 and HSV-2 in individuals with high risk behavior who attended Integrated Counseling and Testing Centre ( ICTC ) for HIV testing and to compare it with the control group. Within high risk behavior group also we compared the seroprevalence of HSV-1 and 2 between HIV positive and HIV negative individuals.

**Methods:** The study included 300 individuals with high risk behavior attending ICTC centre and diagnostic serology for HSV-1 and HSV-2 was simultaneously done in addition to the routine HIV testing.300 age and sex matched samples were also taken from healthy blood donors.

**Results:** we found a high seroprevalence i.e 91% of HSV-1 and relatively lower sero- prevalence i.e 7% of HSV-2 in high risk individuals. 23 patients among the study group were HIV positive and in these patients HSV-1 was positive in 17 (73%) and HSV-2 was positive in 7 (30.4%). In the control group seroprevalence of HSV-1 was 89% and HSV-2 was 0%.

**Conclusion:** Seroprevalence of HSV-1 is high in both high risk and control group but HSV-2 seroprevalence is remarkably high in HIV positive individuals as compared to the other high risk HIV negative individuals and control group.

JK-Practitioner2019;24(3-4):23-27

### Introduction:

Hippocrates first documented the lesions caused by Herpes virus and called them "Herpes" which is a word derived from reptiles in reference to the skin vesicles formed. Herpes simplex virus (HSV) is a DNA virus that belongs to family herpesviridae. HSV 1 and 2 type viruses share almost 50% nucleotide sequence homology<sup>1</sup>.

Herpes simplex virus infections (HSV) are common throughout the world and tend to cause recurrent infections lifelong<sup>2</sup>. Estimates show that at present 20 million people are infected with HSV-2 worldwide and approximately 20 million new cases occur each year<sup>3</sup>. Among European countries, the prevalence of HSV-2 fluctuates and is highest in Turkey (40%) and lowest in England (5%)<sup>4</sup>. Higher rates of HSV-2 are found in sub-Saharan Africa with prevalence ranging from 10-50 % in men and 30-80% among women<sup>5</sup>.Data from India is sparse but the limited number of studies have shown HSV-2 seroprevalence among sexually transmitted disease clinic attendees ranging from 43% to 83% and lower in general population ranging from 7.9% to 14.6%<sup>6-9</sup>.

Initially there was a belief that HSV 1 causes non genital lesions and HSV 2 causes lesions below the waist, however now studies

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### Indexed

Scopus,INDMED ,EBSCO & Google  
Scholar among others

### Cite this article as:

Wani S, Farhana A, Pattnaik S, Nasir R, Fazli T, Zahoor D, Mohiuddin Z, Rashid K. Seroprevalence of Herpes simplex virus 1 & 2 in high risk behavior individuals in a tertiary care centre. JK-Practitioner2019;24(3-4):23-27

Full length article available for download at [jkpractitioner.com](http://jkpractitioner.com) two months after publication

### Key Words:

HSV,High Risk individuals,  
Seroprevalence, HIV

suggest that not only has the prevalence of HSV 1 increased in genital lesions but it has even exceeded that of HSV2<sup>10</sup>. HSV 1 and 2 both can cause clinically indistinguishable lesions at oro-genital and orolabial sites<sup>11</sup>. Falling prey to these infections are people of all ages and they present with spectrum of diseases ranging from asymptomatic infections to neonatal death<sup>12</sup>.

There is although a considerable variation from region to region and within population groups as well. HSV 1 seroprevalence has exceeded HSV2 seroprevalence in most parts of the world<sup>13</sup>. Data from Asian countries is sparse but the limited number of studies have shown lower prevalence of HSV, especially HSV2(14). Women are affected more than men worldwide especially among young people<sup>15</sup>.

It is important to pick up asymptomatic herpetic infections as well because they facilitate acquisition of human immunodeficiency virus<sup>16</sup>. The risk of acquiring HIV is 2-3 times higher in HSV-2 positive individuals and the reasons for same is thought to be recruitment of activated CD4 cells to the genital area, which are targets for HIV, and breaks in the protective epithelial layer during active HSV-2 infection<sup>17-19</sup>.

We have chosen this study in order to find the seroprevalence of these infections in patients with high risk behavior as it is important for putting prevention and control strategies in place. Also in order to compare the seroprevalence of HSV-1 and HSV-2 in HIV positive and HIV negative high risk individuals and to compare them with age and sex matched controls.

#### Materials and methods:

This study was conducted from September 2017 to June 2019 in the Department of Microbiology, Government Medical College Srinagar. Approval for the same was obtained from the ethical committee of the institution. The study included 300 individuals with high risk behavior attending ICTC centre for HIV testing and 300 sex and age matched controls. Healthy blood donors were taken as controls. Demographic data and information about sexual activity was gathered from the individuals.

Five ml of blood was collected from all the patients and controls and diagnostic serology was done for HSV-1 and HSV-2 using type specific IgG by indirect immunoassay using ELISA (BIOGENIX, Lucknow) immunoassay kit of herpes simplex 1 [HSV1 IgG] and herpes simplex type 2 [HSV 2 Ig G] following the kit instructions.

#### Results:

Out of the 300 individuals, 273 (91%) were seropositive for HSV-1, and only 7 (2.3%) were positive for HSV-2. All the 7 cases that were positive for HSV-2 were positive for HSV-1 as well. Among the 300 high risk behavior individuals, 23 were HIV positive and 277 were HIV negative. In the HIV positive individuals HSV-1 seroprevalence was 73.9% and HSV-2 seroprevalence was 30.4%. The seroprevalence in control group was 89% for HSV-1 and 0% for HSV-2.

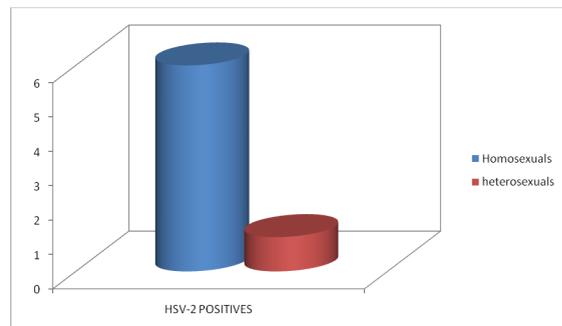


Fig-1: Seropositivity of HSV-1 and 2 in study and control group.

In our study group of high risk individuals seropositivity of HSV-1 was very high 273(91%) while as HSV-2 was positive in 7 (2.3%) individuals. All the HSV-2 positive cases were positive for HSV-1 as well. In control group also seropositivity of HSV-1 was comparable to high risk group , it was positive in 267(89%) while none of the controls were HSV-2 positive.

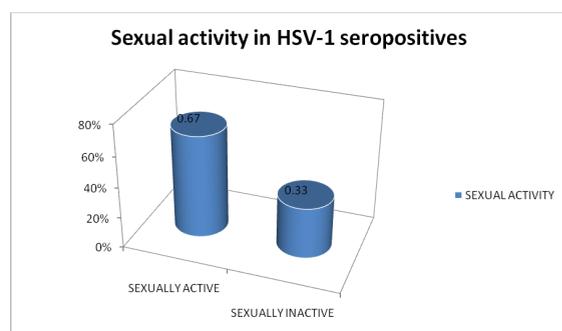
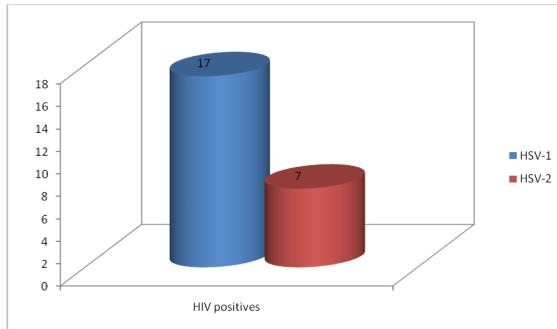


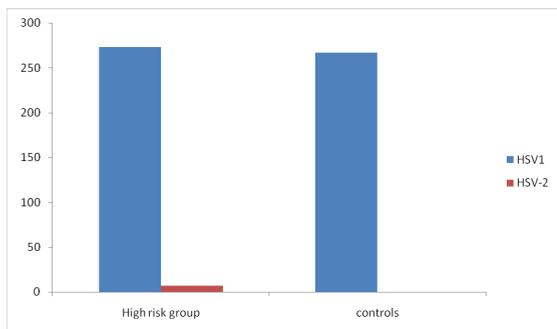
Fig2: SEROPOSITIVITY OF HSV-1 and HSV-2 IN HIV POSITIVE INDIVIDUALS

In HIV positive individuals HSV-1 was positive in 17 (73.9%) and HSV-2 in 7(30.4%). All the HSV-2 positives were positive for HSV-1 as well.



**Fig-3 Sexual activity of HSV-1 SEROPOSITIVES IN HIGH RISK GROUP**

Among the 273 HSV-1 seropositives, 201 (67%) were sexually active.



**Fig-4: SEXUAL BEHAVIOUR OF HSV-2 POSITIVES**

All the HSV-2 positives were found in HIV positive individuals and all of them were sexually active. Among them 6(85.7%) were heterosexuals and 1 (14.3%) was homosexual.

#### **Discussion:**

This study is the first of its kind reported from the state of Jammu and Kashmir. This study which was done on a group of high risk behavior individuals gives us the result of very high prevalence (91%) of HSV-1 and a low prevalence (2.3%) of HSV-2. In our control group also the seropositivity was high for HSV-1 (89%) which is statistically insignificant from the high risk group. Goldman has stated that prevalence of HSV-1 infection is high in most geographic areas worldwide<sup>13</sup>, he also stated that the seroprevalence of HSV-2 is in general highest in areas of Africa and parts of America, moderate in western and southern Europe and lowest in Asia<sup>13</sup>. The results of our study about HSV-1 seroprevalence are consistent with another study from south India wherein they have reported a seroprevalence of 91.5% for HSV-1<sup>14</sup>, although the seroprevalence of HSV-2 in our study is much lower as reported by other studies<sup>14,20</sup>. The reason may be the geographic, ethnic and religious differences with rest of India.

As our state has muslim majority, it is one of the reasons for low seroprevalence of HSV-2 as has been reported by Purnima et al in yet another study from India<sup>20</sup>.

Initially only HSV-2 seroprevalence was considered as a predictor of genital herpes but with recent trend towards increasing sexual acquisition of HSV-1 in adolescence and early adulthood, both HSV1 and 2 need to be tested to get a clearer picture of genital herpes<sup>21,22</sup>.

In our study the prevalence of HSV-2 antibodies was strongly related to sexual behavior and presence of HIV as well. Most of our HSV-2 positive individuals did not give a history of genital herpes, indicating that HSV-2 infection was present without symptoms in most of the HIV infected individuals in our study. As has been documented by studies that the shedding of HSV is more common in HIV infected persons than HIV negative individuals so their partners are at higher risk of getting HSV transmitted to them and should use condoms to protect against transmission of HIV as well as HSV<sup>23-25</sup>. Also the new vaccines against HSV-2 that are under development will also have a role to play in HIV prevention.

Serological tests (IgG) used in diagnosis of HSV generally indicate a past infection<sup>26</sup>. This kind of study is important in assessment of asymptomatic people. In a global review done by Smith et al on type specific HSV prevalence in different geographic areas, they concluded that HSV-2 seroprevalence is highly variable and is greatly affected by place, subgroup, sex and age<sup>13</sup>.

Knowing the seroprevalence of HSV-1 in young females has significant implications for introduction of prophylactic HSV-2 vaccine as this vaccine will probably only be effective when when these women are seronegative for both HSV-1 and HSV-2<sup>27</sup>. Also as HSV-2 infection increases the chances of other sexually transmitted infections, we need to find the asymptomatic HSV-2 positive individuals in order to curb this problem at a very early stage<sup>28</sup>.

To the best of our knowledge our study is the first of its kind done in this geographic region and we have recorded a very high seroprevalence of HSV-1 in our study as well as control group and high seroprevalence of HSV-2 in HIV positive individuals. The high prevalence of HSV-2 in HIV positives has serious implications because HSV-2 increases the chances of acquiring HIV, so if found at an earlier stage we can put appropriate control measures in place and decrease the risk of transmitting HIV in HSV-2 positive individuals.

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