

Seroepidemiology of infection with herpes simplex virus types 1 and 2 (HSV1 and HSV2) among asymptomatic university students attending Islamic Azad University of Kazeroun, southwest of Iran

Daryoush Tayyebi*, Sfandiar Sharifi

Department of Biology, Islamic Azad University, Kazeroun Branch, Kazeroun, Iran

ABSTRACT

Background: Herpes simplex virus type 1 and type 2 (HSV-1 and HSV-2) are common infectious agents worldwide. Data on prevalence of HSV-1 and HSV-2 infections are limited in Asia, especially in Iran. Our study aimed on determination of seroepidemiology of HSV-1 and HSV-2 infections in asymptomatic healthy students of Islamic Azad University of Kazeroun, Fars province, southwest of Iran.

Patients and methods: The study population included 360 students with a mean age of 22.2 years. Demographic data were gathered by a well-designed questionnaire. For serological studies, 5 ml of blood sample was collected and centrifuged. Enzyme linked immunosorbent assay (ELISA) was used to determine immunoglobulin G (IgG) antibody titer to the HSV-1 and HSV-2.

Results: Totally, HSV-1 and HSV-2 IgG antibody were positive in 285 (79.2%) and 84 (23.3%) subjects, respectively. The seroprevalence of HSV-2 was higher among females (29.0%) compared with males (17.5%) ($p < 0.05$), however, there was no significant correlation between gender and HSV-1 seroprevalence.

Conclusion: Results confirm a high prevalence of HSV infection. Our findings were in agreement with prior studies in which HSV-2 infection was more prevalent among female subjects. The high prevalence of HSV infection underlines the need for focusing on preventive efforts and education among the population.

Keywords: Seroprevalence, Herpes simplex virus, ELISA (enzyme linked immunosorbent assay), Iran. (Iranian Journal of Clinical Infectious Diseases 2010;5(2):84-88).

INTRODUCTION

Infections with herpes simplex virus type 1 (HSV-1) and type 2 (HSV-2) are among the most common human viral infections worldwide (1). The viruses cause lasting and recurrent infections throughout life (2,3).

HSV-1 and HSV-2 infect humans of all ages, and they are the etiologic agents of common skin

and mucosal diseases (4,5). Both subjects with symptomatic lesions and asymptomatic individuals can shed virus particles and transmit HSV (6).

Geographic and socioeconomic diversities have brought about differences in HSV prevalence among various populations and regions (1).

HSV-1 is typically transmitted during childhood through nonsexual routes and is associated with oro-facial infections commonly known as “fever blisters” (3,7,8).

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Reprint or Correspondence: Daryoush Tayyebi

Department of Biology, Islamic Azad University, Kazeroun Branch, Kazeroun, Iran

E-mail: dtayyebi@yahoo.com

HSV-1 seroprevalence and early infant acquisition is much higher in many developing countries, where adult seroprevalence nears 100%. Such high levels of HSV-1 acquisition probably reflect extensive infant salivary spread in poorer hygienic conditions (9).

HSV-2 is commonly the cause of anogenital herpes or genital ulceration and is acquired predominantly after initiation of sexual activity (7,8). Some studies showed that a history of STI and the number of sexual partners were markers of higher risk of HSV2 infection (6).

Studies have shown that in the United States about 17% of adults have antibodies to HSV-2 and 58% against HSV-1. Over two-thirds of these persons are not aware of their infections, although they transmit most of these viruses (2,6).

In similar aged adults, the number of HSV-2 infections in the United States is generally higher than Europe and in women is higher than men as well (5).

The estimated total number of people aged 15–49 years who were living with HSV-2 worldwide in 2003 was 536 million (roughly 16% of the world's population in this age range). Furthermore, the HSV-2 prevalence increased with age and was generally higher among women than among men; while the total number of people who were newly infected with HSV-2 in 2003 was estimated to be 23.6 million (10).

There is a clear age dependency in the seroprevalence of HSV-1 and HSV-2 in both Europe and the United States (3). Most HSV-1 and HSV-2 infections are subclinical, however, it is possible for HSV-2 to cause oro-facial herpes and HSV-1 to cause genital herpes. In addition, they sometimes cause serious problems, such as blindness, encephalitis and neonatal death, especially in immunosuppressed hosts or neonates (1,3,8,11).

In some developed countries, there has been a reduction in overall HSV-1 seroprevalence as a result of decreased acquisition in infancy over

recent decades. In contrast, there is a worldwide trend towards increasing sexual acquisition of HSV-1 in adolescence and early adulthood (9).

The severity and recurrence of genital infection with HSV-1 is less than genital infection with HSV-2. Because of the antigenic similarity between HSV-1 and HSV-2, it is possible that previous infection with one may provide protection against subsequent infection by the other (3).

In comparison to subjects who have antibodies against HSV-1 those lacking HSV-1 antibodies are almost 3 times more likely to have a symptomatic HSV-2 infection (8).

Many studies show that genital herpes has a potential facilitative effect on transmission and acquiring the human immunodeficiency virus (HIV) and approximately double the risk for sexually acquired HIV infection, this makes the development of HSV control methods a priority (1,2,8).

Seropositivity is a potential indicator of infectivity and can be used to guide and reform behavioral patterns for prevention of HSV transmission (12). Undiagnosed and untreated genital herpes infections in pregnant women could be vertically transmitted to neonates and thereby cause infant's morbidity and mortality (13).

With several HSV candidate vaccines in clinical trial and antiviral therapy available, a clear understanding of the epidemiology of HSV in different populations is required to develop the most effective and appropriate preventive and control strategies (14).

The present study aimed on determination of seroepidemiology of HSV infection in a group of Iranian students.

PATIENTS and METHODS

The present study was conducted on 360 serum samples (177 males and 183 females) collected from students attending Islamic Azad University of Kazeroun, Fars province, southwest of Iran.

All participants were recruited by flyers and announcements in classrooms and voluntarily gave consent to participate in this study, after which, their demographic data were recorded via a well-designed questionnaire. They were 19-25 years old full-time students without a known history of genital sores or genital herpes.

Having explained our goal, 5ml of peripheral venous blood was obtained, then allowed to clot, and centrifuged at 1000g for 10 minutes. Sera were transferred to microtubes of 0.5-1 ml and were frozen and stored at -20°C.

Type specific serum antibodies to HSV-1 and HSV-2 were detected using HSV-1 ELISA IgG and HSV-2 ELISA IgG kits (Dia Pro, Italy) at the immunology laboratory of Kazeroun University.

ELISA tests were performed according to the manufacturer's instructions.

Pearson's chi-square (χ^2) test was applied to compare HSV-1 and HSV-2 seropositivities among different groups of students, taking in account their sex and field of study. Statistical significance was set at $P < 0.05$.

RESULTS

The study population included 177 (49.2%) males and 183 (50.8%) females with the mean age of 22.2 years (a range, 19 to 25 years).

HSV-1 and HSV-2 seropositivity were 79.2% (285 persons) and 23.3% (84 persons), respectively. Antibodies for both HSV-1 and HSV-2 were present in 18.9% (68 persons), and 15.8% (57 persons) had no indication of HSV infection.

As expected, HSV-1 seroprevalence was significantly higher than HSV-2. We found that females had a higher risk of HSV-2 infection (29.2%) compared to males (17.5%), however there was no significant correlation between gender and HSV-1 infection (NS).

Table 1 represents demographic data and seroprevalence of HSV-1 and HSV-2 according to gender.

Table 1. Demographic characteristics and seroprevalence of HSV-1 and HSV-2 infection

	Males (n=177)	Females (n=183)
Mean age (year)	22.4	22.0
Marital status		
single	168(94.9)	166(90.7)
married	9(5.1)	17(9.3)
HSV-1 infection	133(75.2)	152(83.1)
HSV-2 infection	31(17.5)	53(29.0)
HSV-1 and HSV-2 coinfection	21(11.9)	47(25.7)
HSV-free condition	32(18.1)	25(13.6)

DISCUSSION

Up to 70% of genital HSV infections are unrecognized, hence seroepidemiological studies are critical for understanding the pattern and distribution of infection within populations (15).

In spite of the large prevalence and growing incidence of herpes simplex infection (HSV-1 and HSV-2), relatively few studies on seroprevalence of these infections have been published, and such information is more scarce for Iranian population.

To our knowledge, this is the first report on seroprevalence of HSV-1 and HSV-2 among Iranian students obtained by type specific serological methods.

The seroprevalence of HSV-1 infection in our study (79.2%) was substantially lower than some African countries where its seroprevalence has been reported to reach 90% or over (16). In contrary, our prevalence was somewhat higher than some industrialized countries such as the United States, England, Germany, Australia, Canada, Japan and Israel (1,2,4,5,9,11,17). Thus it seems that, in Iran, HSV-1 infection is acquired at a younger age.

Nowadays, HSV-1 is the main causative agent of genital herpes in the United States, Europe and some developed countries, while its occurrence is increasing in various groups of populations such as college students (3,8).

Similarly, in our study HSV-1 seroprevalence (79.2%) was higher than HSV-2 (23.3%) which is

in agreement with the reported results from different regions of the world where the prevalence of HSV-1 infection in various age groups and in non-high risk populations (sex-workers are considered a high risk populations) is higher than HSV-2 infection (5).

In addition, we found that the seroprevalence of HSV-2 infection (23.3%) was lower than some African countries (82% in certain populations) and higher than some industrialized countries (1,9,14,17). Furthermore, our results indicate a higher rate of HSV-2 infection in women than in men which is in agreement with most previous findings in other countries (5,10,15).

The prevalence of HSV-2 infection varies among developed countries; for instance, its seroprevalence among healthy adults is higher in the USA than in Europe. Likewise, HSV-2 seroprevalence varies widely among European countries (7).

HSV-2 prevalence was relatively high in our non-high risk population. Since HSV-2 infection might be a co-factor in the acquisition and transmission of other sexually transmitted diseases including HIV, and since genital HSV infection in childbearing women poses a risk for the newborn, this finding is important for public health considerations (17).

In conclusion, this study highlights the frequency of HSV infections in university students. Efforts to reduce these infections through either behavioral interventions or immunization should target children before adolescence.

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