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Seroprevalence Rate of Herpes Simplex Virus Type (2) Infection among Homeless Population in Khartoum (Sudan)

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Abstract

Background: Herpes simplex virus type 2 (HSV-2) is the dominant cause of genital ulcer disease worldwide. HSV-2 infection is associated with a three-fold increased risk of HIV-infection all over the globe.

Objective: To estimate the of herpes simplex virus type-2 infection among homeless population in Khartoum (Sudan).

Materials and methods: This descriptive cross-sectional study was conducted during the period from April to May 2019 in Khartoum (Sudan). A structured and pre-tested questionnaire was used to collect demographic and clinical data. The enzyme-linked immunoassay (ELISA) technique was performed to determine the positivity of HSV-2 IgM antibodies among 85 homeless participants.

Results: Among 85 homeless participants enrolled in the current study, 53 were males (62.4%) and 32 were females (37.6%). HSV-2 IgM was detected in 35 participants (41.2%). The HSV-2 seropositivity statistically was not associated with all socio-demographic variants.

Conclusion: A high seroprevalence rate of HSV-2 infection was detected among homeless population in Khartoum (Sudan).

Keywords: Seroprevalence rate , Herpes simplex virus type-2, Homeless population, Khartoum.

Introduction

Herpes simplex virus type 2 (HSV-2) belongs to the genus simplex virus, which is one of eight species of human herpesviruses (HHV). The herpesviruses belong to the family Herpesviridae. It has a genome of linear dsDNA, icosahedral capsid, amorphous integument surrounding the capsid, and outer envelope. HSV-2 goes through periods of non-replication (i.e., latency), and periods of reactivation, during which viral shedding occurs from the site of initial infection. Herpes simplex virus type 2 (HSV-2) belongs to the genus simplex virus, which is one of eight species of human herpesviruses (HHV). The herpesviruses belong to the family Herpesviridae. It has a genome of linear dsDNA, icosahedral capsid, amorphous integument surrounding the capsid, and outer envelope¹

HSV-2 goes through periods of non-replication (i.e., latency), and periods of reactivation, during which viral shedding occurs from the site of initial infection. The infection of HSV-2 is a long-

life infection without any cure. Most of the infected persons are not aware of their virus carriage, and both asymptomatic and symptomatic persons can transmit the virus to others. HSV-2 is the dominant cause of genital ulcer disease worldwide and can cause disseminated infection and central nervous system disease complications. Moreover, the transmission of HSV-2 from mother to child during pregnancy causing morbidity and mortality among infected infants². Genital herpes (HSV-2) is one of the most common sexually transmitted infections (STIs) worldwide, affecting one in every 10 individuals. The seroprevalence of HSV-2 is 21% - 24% among women in the general population of the United States. According to the United Nations; homelessness cases describes the condition of people without physical shelter and who sleep outdoors, in vehicles, abandoned buildings or other places not intended for human habitation. Poor living conditions and limited access to health care systems are key factors that place homeless persons at an increased risk for communicable infections³.

There is no precise estimation of the number of homeless people and the rate of their risky behaviors in Sudan. This study aimed to investigate the prevalence of HSV-2 among the homeless in Khartoum and to evaluate the high-risk behaviors associated with this infection. The infection of HSV-2 is a long-life infection, and there is no cure. Most of the infected persons are not aware on their carriage of the virus, but both asymptomatic and symptomatic persons can transmit the virus to others. HSV-2 and can cause disseminated infection and central nervous system disease complications. Moreover, the transmission of HSV-2 from mother to child during pregnancy causes high morbidity and mortality among infected infants⁴.

Poor living conditions and limited access to health care systems are key factors that place homeless persons at an increased risk for communicable infections. There is no precise estimation of the number of homeless people and their risky behaviors in Sudan.

This study aimed to investigate the prevalence rate of HSV-2 among the homeless population in Khartoum and to evaluate the high-risk behaviors associated with this infection.

Materials and methods

This study was conducted as a community-based service, and samples were collected through field clinics from April to May 2019 in Khartoum (Sudan). 85 homeless participants were conveniently recruited onto the study. Demographic and clinical data of all participants who were willing and consented to participate in the study were collected by face to face interview using a structured and pre-tested questionnaire before collecting their blood samples.

The study was approved by Al-Neelain University Ethical Board and informed consent was obtained from each participant before collecting their data and samples.

About 5 ml venous blood were drawn from each study participant, dispensed into a serum separator tube and transported in ice to the laboratory. At the laboratory, the samples were centrifuged at 1500 rpm for 5 minutes to obtain serum for serological testing. All sera were stored at -20°C prior to testing. The sera were tested according to the manufacturer's protocol for detection of HSV-2 IgM antibodies by ELISA technique (Chemux Bio-Science, Inc - US). Presence of HSV-2 IgM antibodies was considered as evidence for exposure to HSV-2 infection. Statistical analysis: The data obtained from the questionnaire and sample testing results were entered into a database and analyzed using statistical package for social sciences (SPSS).

Descriptive statistics were reported as the mean \pm SD for continuous variables and as the frequency (%) for dichotomous variables. To evaluate the relationship between different factors, we performed a chi-square analysis. Quantitative variables were compared using the independent T-test. *P. values* < 0.05 were considered statistically significant.

Results

A total of 85 homeless participants were enrolled in this study. 85 participants were investigated, 53 (62.4%) were males and 32 (37.6%) were females (Table 1).

Table (1): Seropositivity and socio-demographic data of homeless population

Parameter	Frequency rate		HSV-2 IgM		p - value
	No.	%	No.	%	
Age groups					
School-age children	24	28.2	12	14.1	0.543
Adolescents	09	10.6	02	02.4	
Young adult	29	34.1	12	14.1	
Middle-aged and elderly	23	27.1	09	10.6	
Gender					
Males	53	62.4	20	23.5	0.273
Females	32	37.6	15	17.7	
Homeless duration (Years)					
01 - 05	32	37.7	13	15.3	0.333
06 - 10	21	24.7	12	14.1	
11 - 15	11	12.9	04	04.7	
16 - 20	14	16.5	03	03.5	
>20	07	08.2	03	03.5	
Ex-marriage sexual activity					
Yes	34	40	12	14.1	0.251
No	51	60	23	27.1	
Sexual Partners					
No partner	53	62.3	24	28.2	0.611
One partner	23	27.1	08	09.4	
Multiple partners	09	10.6	03	03.5	
IV drug abuse					
Yes	16	18.8	05	05.9	0.273
No	69	81.2	30	35.3	
Alcoholism					
Yes	10	11.8	05	05.9	0.392
No	75	88.2	30	35.3	
Total					
	85	100.0	35	41.2	

The age incidence ranged between 2-65 years; the majority were between 18-35 years, and the mean age was 26 years. The homeless duration of participants ranged between a few months to more than 35 years (Table 1).

40% of the participants had frequent ex-marriage sexual activities: 27.1% of them had one partner and 10.6% of them had multiple partners. 18.8% of them were indulged in drug abuse, and 11.8% of them were alcohol addicts. Seroprevalence rate of HSV-2 IgM antibodies among the 85 homeless volunteers investigated was 41.2%. There was no significant association between the HSV-2 seropositivity and socio-demographic characteristics ($p > 0.05$). (Table 1)

Discussion

In the present study, serum samples of 85 homeless participants were investigated to detect the seropositivity rate of HSV-2 IgM antibodies in Khartoum (Sudan). HSV-2 infection prevalence rate is highly variable and depends on many factors including: residence, population subgroups, gender, and age incidence. The high prevalence rate of HSV-2 in sheltered-homeless adults might be related to the fact that infectious diseases are more prevalent among homeless people. Indeed, overcrowded, sheltered, poor living conditions and limited access to healthcare systems may expose homeless persons to communicable infections, which may spread and lead to serious public health concerns which lead to higher susceptibility of numerous infections⁵.

Among the 85 participants there were 53 males (62.4%) and 32 females (37.6%). This difference suggests that homelessness is proportionally high in males than in females.

This was the first study assessing among homeless people in Khartoum State (Sudan). The seroprevalence rate of HSV-2 infection worldwide among the general population is estimated within 2 - 24%. In the present context a high seroprevalence rate (41.2%) of HSV-2 infection is reported among homeless population, suggesting that homeless people are at disproportionately high risk for negative health outcomes.

A recent survey in Tehran (Iran) was conducted to assess the prevalence rate of HSV-2 IgG antibodies among sheltered homeless adults reported that the HSV-2 prevalence rate in this group was higher than the general population⁵.

A similar study reported an extremely higher prevalence rate among homeless women in Uganda was 88%⁶.

In this study, HSV-2 seropositivity was high in females (46.9%) than in males (37.3%). This finding appears to be consistent across several geographic sites and suggests a higher risk of HSV-2 acquisition in women than men. The high prevalence rate of HSV-2 among women in childbearing age reveals the potential for HSV-2 transmission from mothers to infants and an increased risk of acquisition of HIV-infection as well. Many studies reported that the HSV-2 prevalence rate is in general higher among high-risk sexual behavior individuals.

In this study multiple partner participants were not associated with the infection. This may be due to the small number of participants investigated.

Many studies also linked alcoholism and drugs abuse risk factors with for infections in homeless people. In our study we found no statistically significant relationship between these factors and HSV-2 infection.

The present study limitations may be attributed to the small sample size, thus statistically may be not possible to identify significant relationships within the data set. Also, the study questionnaire

contained sensitive questions, which may have caused social desirability bias due to the under-reporting of high-risk behavior.

Recommendations: Screening all homeless for HSV-2 infection, with additional counseling for sexual risk, alcohol and drug use, may lead to the identification of more infections and be a first step in reducing additional disease transmission. Furthermore, research projects is needed to evaluate the prevalence and impact of genital herpes in Khartoum in order to inform public health policies.

Conclusion: A high seroprevalence rate of HSV-2 infection was detected among homeless population in Khartoum (Sudan).

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Ali, et al., 2020: Vol 5 (3)