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SHORT COMMUNICATION

Serological profiles of Herpes simplex virus type 2 among HIV negative population in Mwanza City, Tanzania

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Abstract
Herpes simplex virus type-2 (HSV-2) is the major cause of genital ulcer diseases (GUD) consequently a significant factor for the acquisition and transmission of human immunodeficiency virus (HIV). Despite its importance there is paucity of data regarding the magnitude of HSV-2 in non-HIV infected population in middle-and-low income countries. This study was designed to determine the seroprevalence of specific HSV-2 antibodies among non-HIV population in Mwanza City, Tanzania. A total of 174 non-HIV infected individuals were enrolled and tested for HSV-2 IgM and IgG antibodies using one step HSV-2 rapid Test. The median age of study participants was 28 years (IQR= 23-36 years). Of the 174 enrolled individuals, 22 (12.6%, 95% CI: 7.6-17.5) were HSV-2 IgG seropositive while none of the participants was HSV-2 IgM seropositive. This study shows that a significant proportion of non-HIV infected population is seropositive for HSV-2 antibodies. This might increase the risk of becoming infected with HIV and other sexually transmitted infections.

Keywords: Herpes simplex, antibodies, seroprevalence, HIV/AIDS, Tanzania

Herpes Simplex Virus Type-2 (HSV-2) infections is one of the most common sexually transmitted infections (STIs) and causes majority of genital ulcer diseases (GUD). In the most cases the infection is chronic and present both as asymptomatic and symptomatic illness (Agabi *et al.*, 2010). HSV-2 infections have been found to be associated with increased risk of acquisition of human immunodeficiency virus (HIV) (Wald & Link, 2002). After initial infection the viruses often remain latent and tends to recur periodically in cases of immunosuppression (Johnson *et al.*, 1984). The majority of the primary and recurrent infections are asymptomatic (Wald & Ashley-Morrow, 2002). In symptomatic cases, lesions are very painful(Corey & Handsfield, 2000) which affect the normal routine activities of the infected individuals (Mark *et al*., 2009). Due to limited health services and poor health seeking behaviour, HSV-2 is more common in resource limited countries mostly sub-Saharan Africa (Van Dyck *et al*., 2004). In Sub Saharan Africa the prevalence as high as 82% has been reported (Weiss, 2004). The HSV-2 is a public health problem in north-western part of Tanzania especially among HIV individuals (Rodríguez *et al*., 2002; Watson-Jones *et al.*, 2008; Kapiga *et al.*, 2013). In most African countries, HSV-2 prevalence has been found to be common in areas where other STIs are also common (Smith & Robinson, 2002).

Effective management and control of the HSV-2 diseases requires clear understanding of the epidemiology and burden of HSV-2. Therefore, this study aimed at determining the seroprevalence of the specific HSV-2 antibodies and associated factors among non HIV infected individuals in Mwanza City, Tanzania.

A total of 174 non HIV infected health professional students were enrolled between April and May 2016 from Mwanza City, Tanzania. Sociodemographic information such as age, sex, marital status and other relevant information were collected using structured questionnaire. About 4mL of blood sample was collected from each participant using plain vacutainer tube (Becton, Dickinson and Company, Nairobi, Kenya). Samples were transported to the laboratory immediately after collection whereby sera were extracted and stored at -40^{o}C till analysis. Detection of HSV-2 antibodies was done using one step HSV-2 rapid test as per manufacturer's instructions (INVBIO Biomaterials Solutions, Beijing, China). The test has sensitivity and specificity

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of >95%. Data were analysed using STATA version 12. Continuous variables were summarized as median with interquartile range while categorical variables were summarized as proportions. Two-sample Wilcoxon (Man Whitney) Rank Sum test was used to compare medians between groups. Chi square test was used to compare associations between categorical variables. P value of <0.05 was considered as statistically significant. This study was ethically cleared by the joint Catholic University of Health and Allied Sciences/Bugando Medical Centre Research Ethics and Review Committee.

Table1: Seroprevalence of specific HSV-2 IgG antibodies in relation to sociodemographic characteristics among HIV negative health professional students in Mwanza city

Characteristic	Response	HSV-2 seronegative (%)	HSV-2 seropositive (%)	P-value
Age (median)		28(IQR:23-35)	31(IQR:21-37)	0.922
Sex	Female	101(90.2%)	11(9.8%)	
	Male	51 (82.3%)	11(17.4%)	0.132
Marital status	Married	57(85.1%)	10(14.9%)	
	Single	95(88.8%)	12(12.2%)	0.474
Intravenous injection	Yes (17)	16(100%)	0(.0.00%)	
	No (244)	136(86.1%)	22(13.9%)	0.103
History of blood transfusion	Yes (18)	10(90.9%)	1(9.1%)	
	No (243)	142(87.1%)	21(12.9%)	0.583
History of surgery	Yes (29)	17(89.5%)	2(10.5%)	
	No (232)	135(87.1%)	20(12.9%)	0.558
Tattooing	Yes(13)	11(100%)	0(0.00%)	
	No(248)	141(86.5%)	22(13.5%)	0.216

The median age of study participants was 28 years (IQR= 23-36 years). The median age of male population was significantly higher than the median age of females (33.5; IQR=27-43 *versus* 25; IQR=22-32.3 years, p<0.001). The seroprevalence of HSV-2 specific IgG antibodies was 12.6% (95%CI: 7.6-17.5). On Wilcoxon (Man Whitney) Rank Sum test there was no significant difference on the median age among HSV-2 sero-negative and sero-positive populations (28; IQR=23-35 *versus* 31; IQR=21-37 years, p=0.922). Out of 62 males, 11 (17.4%) were HSV-2 sero-positive compared to 9.8% of 112 females (p=0.132). (Table1).

Herpes simplex virus type 2 (HSV-2) infection is known to be one of the most common sexually transmitted infection (Romanowski *et al*., 2009). This has been confirmed in the current study whereby the observed prevalence of 12.6% is higher than that of Chlamydia, gonorrhoea, syphilis and HIV recently reported among adolescent pregnant women in the same area (Hokororo *et al*., 2015). However, the reported seroprevalence of HSV-2 in the current study is significantly lower than that reported by Hokororo *et al.* (2015). This could be explained by the difference in population studied where the population in the previous study was at higher risk of STIs than the current population. Surprisingly, the HSV-2 prevalence among non-HIV infected population is significantly lower than that previously reported in Tanzania during the 1990s and early 2000s (Obasi *et al*., 1999; Rodríguez *et al*., 2002) and other African countries (Shaw *et al*., 2001). Low seroprevalence observed in this study could be explained by a decline in STIs prevalence which is due to extensive ongoing campaigns on HIV prevention.

When sex comparison was done, the seroprevalence of specific HSV-2 antibodies was found to be higher among non-HIV infected males than females. This is inconsistent with previous reports among HIV infected population (Auvert *et al.,* 2001; Smith & Robinson, 2002) whereby females had significantly high rates of HSV-2 infections. The higher prevalence in males in the current study could be explained by the fact that they were older than females. Previous studies have documented that as the age increases the risk of HSV-2 acquisition also increases (Smith & Robinson, 2002; Weiss, 2004). Other factors such as history of intravenous injection, blood transfusion, surgery and tattooing have not been found to influence HSV-2 transmission in this study as previously reported by Sarmati *et al*. (2007). The possible explanation could be a small

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number of respondents who reported to have been exposed to these factors. Further studies to confirm these associations in similar settings are recommended.

In conclusion, a significant proportion of non-HIV infected population has been exposed to HSV-2 infections hence increase the risk of HIV and other sexually transmitted infections. There is a need for reproductive health education and STIs education among students in Tanzania in the fight against HIV new infections and other STIs.

Author's contributions

MMM, SEM designed the study; MM, CI participated in data collection; CI did the laboratory work and SEM, MMM performed statistical analysis and interpretation of the data. MMM wrote the first draft of the manuscript. All authors read and approved the final version of the manuscript.

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