

SEROPREVALENCE OF HSV-1 AND HSV-2 AMONG WOMEN ATTENDING ROUTINE CERVICARE CLINICS IN GHANA



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Introduction

Herpes simplex virus infection is a global health concern. Herpes simplex virus has been characterized into two distinct serotypes: **HSV-1** (associated with orofacial infections) and **HSV-2** (associated with genital infections). Sixty to ninety five percent of mature humans are either carrying HSV viruses or are affected by associated diseases which are usually present in the host as latent infections. The large majority of persons with herpes do not know they have the disease.

Both types are highly infectious and can be transmitted from mother to the neonates and increase the mortality rate. Infection with HSV-2 increases the risk of HIV and HPV acquisition, and in association with HPV infection increase the risk of invasive cervical cancer. Estimation of the burden of infection is important in appreciating the scale of the epidemic. Although, HSV infection is not curable, there are effective medications available to treat symptoms and prevent outbreaks. Unfortunately, no vaccine exist to prevent infection of the disease. The data on prevalence of HSV infection in Ghana is very scarce.

Aim

To provide relevant and up-to-date data on seroprevalence of HSV-1 and HSV-2 infection and associated risk factors among women attending routine cervicare clinics in Ghana so as to address health policy issues on the infection.

Method

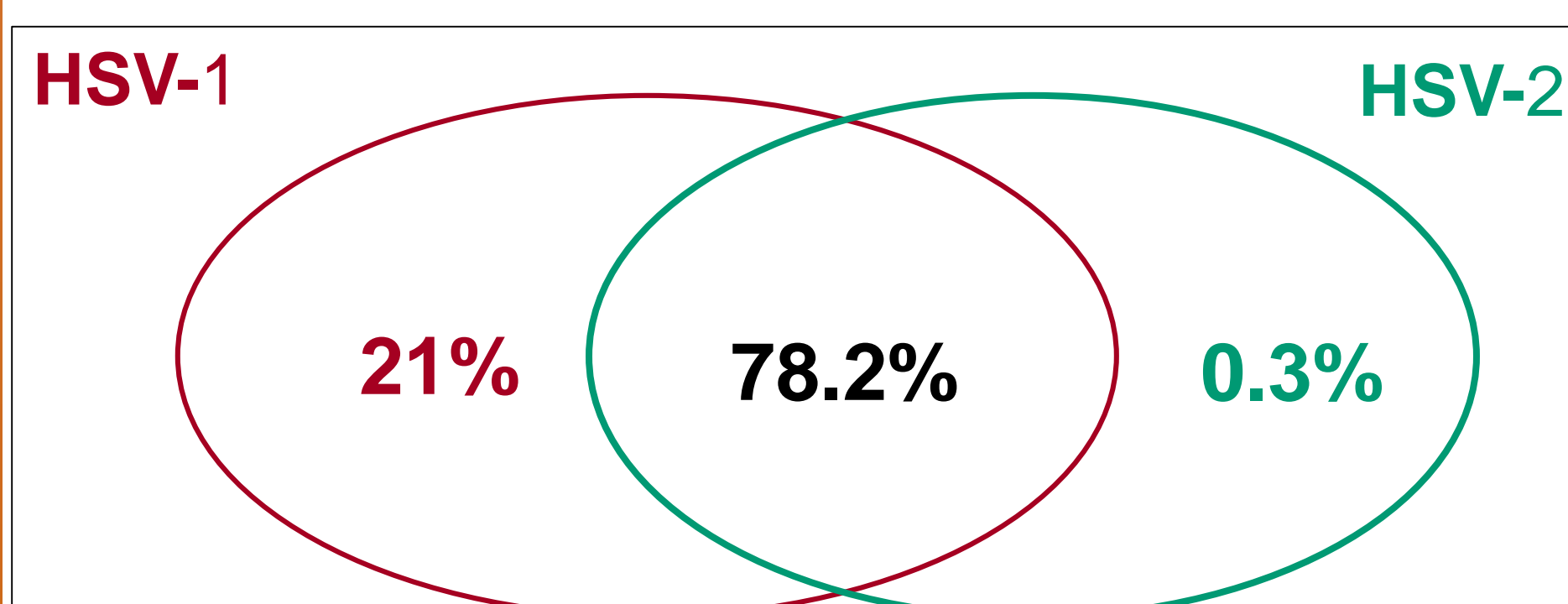
A cross-sectional descriptive study, in which **380** women attending the Cervicare clinics at Regional Hospitals in Kumasi and Accra, Ghana were enrolled. No observable symptoms of cervical ulcers were present among subjects at the time of gynecological examination and no subject with orofacial ulcer was recruited into the study.

The serum HSV-1 IgG and HSV-2 IgG were determined by ELISA method (Calbiotech Inc., CA, USA). The SPSS version 22 was used for statistical calculations. Statistical significance was accepted for $p < 0.05$.

Results

The study showed that HSV-1 seroprevalence among women were **99.2%** (95% CI: 98.0% - 100.0%) where for HSV-2 were **78.4%** (95% CI: 74.5% - 81.8%).

The cross-positive prevalence of HSV-1 and HSV-2 of study participants was **78.2%** (95% CI: 73.9% - 81.6%).



Seroprevalence of HSV-1 and HSV-2 infection among women attending cervicare clinics in Ghana

Table 1. Study population behavioral factors and sero-prevalence of HSV

Characteristic	No. (%)	Prevalence of HSV		
		HSV 1 (N, %)	HSV 2 (N, %)	Both (N, %)
Age of coitarche (years)				
≤ 15	28 (7.4)	28 (7.4)	23 (6.1)	23 (6.1)
16 - 20	192 (50.5)	192 (50.5)	157 (41.3)	157 (41.3)
21 - 25	53 (13.9)	51 (13.4)	38 (10.0)	38 (10.0)
≥ 26	24 (6.3)	24 (6.3)	13 (3.4)	13 (3.4)
Do not remember	83 (21.8)	82 (21.6)	67 (17.6)	66 (17.4)
p-value		0.086	0.021	0.004
Number of life time sex partners				
1	155 (40.8)	154 (40.5)	110 (28.9)	110 (28.9)
2	91 (23.9)	90 (23.7)	73 (19.2)	73 (19.2)
3-9	127 (33.4)	126 (33.2)	109 (28.7)	108 (28.4)
10+	7 (1.8)	7 (1.8)	6 (1.6)	6 (1.6)
p-value		0.976	0.022	0.137

The mean age of participants was **40.83** years (SD ± 11.12). The age group from 25 to 44 years was the most represented (63.2%). Herpes infection increase with age. Our study showed that there was no correlation between age and HSV-1 and HSV-2 ($p=0.799$ and $p=0.895$ respectively).

Majority of the participants were married (58.7%). The literacy among the women were very high (91.1%), among which educated up to the tertiary level were 22.6 % and up to primary- 11.6%.

There was significant differences between number of life sex partners and the prevalence of HSV-2 ($p=0.022$) (Table 1). The higher proportion of women (57.9%) had the first sexual relationship before 20 years. The study showed that the prevalence of HSV-2 decreased as the age at coitarche increased. This association was statistically significant ($p=0.021$). Multiple infection was associated with age of first sexual debut ($p=0.004$), but not with multiple sexual partners ($p=0.137$).

Discussion

The present study is the first report of seroprevalence of HSV-1 among women in Ghana. The high prevalence of this infection (fig. 1) is not surprising. In 2012, the WHO 2012 reported a global prevalence of HSV-1 of 68%, with the highest prevalence in Africa (87%) (Looker et al., 2012a). Our findings on HSV-1 infection is similar to those reported on some African countries. A study conducted among urban women in Uganda and among pregnant women in Benin city of Nigeria also showed very high prevalence of HSV-1 infection 98% and 96.6% respectively (Nakku-Joloba et al., 2014; Iche, 2013). Prevalence of HSV-1 infection among pregnant women in Vanuatu was 100% (Haddow et al., 2001).

In the case of HSV-2 infection our findings is consistent with a few previous studies done in Africa (LeGoff et al., 2008; Kwofie et al., 2015). Those studies focused on a small series of participants. One of the studies showed a seroprevalence of HSV-2 infection among women attending STD clinics in Accra and Kumasi (Ghana) of 71% ($n=278$) (LeGoff et al., 2008).

The other study conducted at KBTH in Ghana among 91 pregnant women also reported a high prevalence of HSV-2 (68%) which similar to our findings. WHO worldwide prevalence of HSV-2 infection was estimated to be 11.3% and highest was in Africa (31.5%) (Kwofie et al., 2015).

The prevalence of HSV-2 in this study was higher compared to the prevalence with other African countries. The prevalence of infection among women was 58% in Uganda, 68% in Zimbabwe, 55% in Zambia and 28% in Gambia (Nakku-Joloba et al., 2014). A study conducted in Sudan among pregnant women reported a prevalence rate of 34.6% for HSV-2 infection and 20.7 % in Tanzania. Two independent studies from Nigeria reported lower sero-prevalence of HSV-2 infection among pregnant women, 44.3% and 47.3% (Iche, 2013; Kalu et al., 2014). However, higher prevalence rate was found among pregnant women in Cote D'ivoire -96.5%. The high prevalence of HSV-2 infection of this study could be due to the high transmission of the virus. The lack of awareness of some viral infections among the population and environmental factors could also be contributed factors. The sexual behavioral factors associated with HSV-2 were young age at sexual debut and multiple sexual partners. Other research supports our findings that earlier age of sexual intercourse is associated with prevalence of HSV-2 infection. Early research works done in USA and Sweden showed that the early age at first sexual exposure was associated with STD and cervical atypia.

Conclusion

The prevalence of HSV-1 and HSV-2 among the women attending the Cervicare clinics in Accra and Kumasi, the two major cities in Ghana was high. The high estimate of HSV infection highlights the critical need for development of vaccines, microbicides, and other new HSV prevention strategies.

The major observed factor found to be associated with sero-prevalence of HSV-2 was age at coitarche and number of life time sexual partners. Public health concern must be geared towards educating women on herpes infection and mode of transmission.

References

- Haddow, L.J., Sullivan, E.A., Taylor, J., Abel, M., Cunningham, A.L. and Tabrizi, S. (2007): Herpes simplex virus type 2 (HSV-2) infection in women attending an antenatal clinic in the South Pacific island nation of Vanuatu. *Sex. Transm. Dis.*, 34:258-261.
- Iche, K.E. (2014): Seroprevalence of herpes simplex virus infection among pregnant women attending antenatal clinic in Benin, Nigeria. *International Journal of Tropical Disease and Health*, 4(1): 70-91.
- Kalu E.I., Ojide C.K., Fowotade A. and Nwadike V.U. (2014): Sexual behavioral correlates with HSV-2 seroprevalence among pregnant women in Nigeria. *J. Infect. Dev. Ctries.*, 8(8): 1006-1012.
- Kwofie, T.B., Ayensu, F., Mutocheluh, M., Narkwa, P., Nguah, S.B., Turpin, C.A. and Owusu, M. (2015): Seroprevalence of rubella virus, cytomegalovirus and herpes simplex virus-2 among pregnant women at the Komfo Anokye Teaching Hospital, Ghana. *Journal of Public Health in Developing Countries*, 1(2): 56-63.
- LeGoff, J., Weiss, H.A., Gresenguet, G., Nzambi, K., Frost, E., Hayes, R.J., Mabey, D.C.W., Malkin, J., Mayaud, P. and Belec, L. (2007): Cervicovaginal HIV-1 and herpes simplex virus type 2 shedding during genital ulcer disease episodes. *AIDS*, 21: 1569-1578.
- Looker, K.J., Magaret, A.S., May, M.T., Turner, K.M.E., Vickerman, P., Gottlieb, S.L. and Newman, L.M. (2015a): Global and regional estimates of prevalent and incident herpes simplex virus type 1 infection on 2012. *PLoS One*, 10:e0140765.
- Looker, K.J., Magaret, A.S., Turner, K.M., Vickerman, P., Gottlieb, S.L. and Newman, L.M. (2015b): Global and regional estimates of prevalent and incident herpes simplex virus type 2 infection on 2012. *PLoS One*, 10:e114989.
- Nakku-Joloba, E., Kambugu, F., Wasubire, J., Kimeze, J., Salata, R., Albert, J.M., Rimm, A. and Whalen, C. (2014): Sero-prevalence of herpes simplex type 2 virus (HSV-2) and HIV infection in Kampala, Uganda. *African Health Sciences*, 14: 782-789.

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