HSV

Herpes simplex virus 2 infection in women attending an antenatal clinic in Fuzhou, China

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Genital herpes caused by herpes simplex virus (HSV) infection is one of the most prevalent sexually transmitted infections (STIs) and the most common cause of genital ulcer disease (GUD) in developed and developing countries. The monitoring of HSV-2 seroprevalence in pregnant women can identify women at a higher risk of HIV and of neonatal HSV transmission. Very few data are available on type specific seroprevalence of HSV-2 in China, with only one previous study from southern China. Consequently, we conducted a survey to determine type specific seroprevalence of HSV-2 and associated risk factors in Fuzhou City, eastern China.

A cross sectional seroprevalence study was conducted from July to September 2002 in an antenatal clinic of Fujian Provincial Maternal and Child Hospital in Fuzhou, China. Of 506 eligible women, 504 (99.6%) agreed to participate. After obtaining informed consent, a questionnaire was administered by a trained female nurse and a genital examination was conducted. Blood samples were collected, centrifuged, and stored at −30℃ for serological testing. At the National Center for STD Control, sera were tested for anti-herpes simplex virus (HSV) type 2 specific IgG antibodies using the HerpeSelect HSV-2 ELISA (Focus Technologies, CA, USA), per manufacturer's instructions. Assay performance was evaluated in China and reported elsewhere.[1] The study was approved by the institutional review committee of the National Center for STD Control, Nanjing.

To assess risk factors for HSV-2 seropositivity, odds ratios (OR) and 95% confidence intervals (CIs) were calculated. Variables that were significant at $p<0.10$ in univariate analyses were selected for multivariate logistic analysis. Multivariate model variables with a probability level of $p \leqslant 0.05$ were considered statistically significant.

A total of 504 female antenatal clinic attendees participated. Excluding two samples with equivocal HSV-2 results, 502 subjects with a mean age of 26.7 years (range 20–40) were finally included for subsequent analyses. The overall HSV-2 seroprevalence was 10.8% (95% CI: 8.3% to 13.8%). Most subjects were married (98.2%), and 66.3% had high school education or greater. A notable proportion of women (41.2%) had migrated to Fuzhou from geographical areas within China. The participants' mean gestation period was 17.7 (SD 3.5) weeks.

The mean age at first sexual intercourse was 23.6 (SD 2.9) years. Only two women (0.4%) reported having a casual sexual partner. More than two thirds (72.4%) reported having sexual acts during pregnancy, of whom only 3% reported consistent condom use. Notably few women reported a previous history of sexually transmitted infections (1%), which included gonorrhoea or genital warts. No woman reported a history of genital herpes. Among the 54 HSV-2 seropositive women, all but one reported no current or previous ulcerative or vesicular symptoms.

Multivariate risk factors associated with HSV-2 seropositivity (table 1) were older age (OR = 5.14; 95% CI, 1.36 to 19.34 for >25 years), lower education (OR = 5.02; 95% CI: 1.28 to 19.65 for ⩽ secondary school), higher monthly income (OR = 5.35; 95% CI: 1.31 to 21.83 for >2000 yuan), less frequent use of condom before pregnancy (OR = 6.16; 95% CI: 1.06 to 35.69 for use in ⩽50% of sex acts), having low abdominal pain (OR = 15.83; 95% CI: 1.42 to 176.90), and having a history of abnormal vaginal discharge (OR = 5.70; 95% CI: 2.28 to 14.24).

This study is the first to present type specific HSV-2 seroprevalence data in women from eastern China. HSV-2 seroprevalence (10.8%) is comparable to that observed in the mid-1990s among Hong Kong residents (12.8%), yet higher than that in residents from southern China (3.2%).[2] HSV-2 seroprevalence data in addition to sexual behavioural information imply that most pregnant women in our study are susceptible to HSV-2 infection during later stages of pregnancy, indicating an important role for counselling messages aimed to reduce the acquisition of HSV-2 infection in late pregnancy in eastern China.

Our findings confirm associations of HSV-2 seropositivity with older age and with lower education, as previously reported.[3 4] Lower income is a risk factor for HSV-2 in a previous study.[5] In contrast, a higher monthly income in our population was associated with higher HSV-2 seropositivity in our study population. This latter association is not well understood, although an association of a higher monthly salary with STIs was found among rural to urban migrants in Beijing.[6] Interestingly, none of the HSV-2 seropositive women reported a history of genital herpes, probably because genital herpes is commonly asymptomatic and inadequate attention is paid to genital vesicles and/or ulcers.

In several global populations HIV infection has extended from core groups, such as injecting drug users and female sex workers, into the general population through sexual transmission.[7] Sexual contact has been the major route of HIV transmission in eastern China.[8] HIV prevalence among pregnant women in China has reached over 1% in some areas.[9] A high seroprevalence of HSV-2 infection and other STIs among the pregnant women in the study area[10] could potentially fuel a heterosexual HIV epidemic in the future.

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Abbreviations: GUD, genital ulcer disease; HSV, herpes simplex virus; STIs, sexually transmitted infections

Table 1 Sociodemographic, behavioural factors, and current and previous symptoms associated with HSV-2 seropositivity: a multiple logistic analysis

Factor	Sample size*	Category	Odds ratio (95% CI)†
Age (years)	194	⩽25	1 (Reference)
	308	>25	5.1 (1.4 to 19.3)
Educational level	169	⩽Secondary school	5.0 (1.3 to 19.7)
	174	High school	0.8 (0.3 to 2.3)
	159	⩾College	1 (Reference)
Monthly income (yuan) of study subject	111	⩽1500	1 (Reference)
	153	1501–2000	1.2 (0.4 to 3.8)
	26	>2000	5.4 (1.3 to 21.8)
Frequency of condom use before pregnancy	75	>50%	1 (Reference)
	426	⩽50%	6.2 (1.1 to 35.7)
Symptom of low abdominal pain	495	No	1 (Reference)
	7	Yes	15.8 (1.4 to 176.9)
History of abnormal vaginal discharge	384	No	1 (Reference)
	118	Yes	5.7 (2.3 to 14.2)

*Totals may not add up to 504 because of missing values.
†95% Confidence interval.

Key messages

- HSV-2 seropositivity was significantly associated with older age, lower education, higher monthly income, less frequent use of condoms before pregnancy, having low abdominal pain, and having a history of abnormal vaginal discharge among pregnant women in eastern China.
- A high seroprevalence of HSV-2 infection plus other STIs in the study area could potentially fuel a heterosexual HIV epidemic in the future.

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REFERENCES

1 **Yin YP**, Chen XS, Song B, *et al*. Performance of the Focus ELISA test for detection of herpes simplex virus type-2-specific antibodies in Chinese STD patients. *Clin Microbiol Infect* 2005;**11**:423–4.
2 **Lo JY**, Lim WWL, Ho DWT, *et al*. Difference in seroprevalence of herpes simplex virus type 2 infection among antenatal women in Hong Kong and southern China. *Sex Transm Infect* 1999;**75**:123.
3 **Bodeus M**, Laffineur K, Kabamba-Mukadi B, *et al*. Seroepidemiology of herpes simplex type 2 in pregnant women in Belgium. *Sex Transm Dis* 2004;**31**:297–300.
4 **Tideman RL**, Taylor J, Marks C, *et al*. Sexual and demographic risk factors for herpes simplex type 1 and 2 in women attending an antenatal clinic. *Sex Transm Infect* 2001;**77**:413–5.
5 **Buchacz K**, McFarland W, Hernandez M, *et al*. Prevalence and correlates of herpes simplex virus type 2 infection in a population-based survey of young women in low-income neighborhoods of North California. *Sex Transm Dis* 2000;**27**:393–400.
6 **Liu H**, Li X, Stanton B, *et al*. Risk factors for sexually transmitted disease among rural-to-urban migrants in China: implications for HIV/sexually transmitted disease prevention. *AIDS Patient Care STDs* 2005;**19**:49–57.
7 **UNAIDS/WHO**. *AIDS epidemic update—special report on HIV prevention*, UNAIDS/WHO, 2005.
8 **Yan Y**, Zheng Z, Shao Y. Analysis on the epidemic characterization and trend of AIDS in Fujian Province. *Chin J Epidemiol* 1999;**20**:23–6.
9 **Ministry of Health of China, UNAIDS, WHO**. 2005 update on the HIV/AIDS epidemic and response in China. Beijing: Ministry of Health, 2006.
10 **Chen XS**, Yin YP, Chen LP, *et al*. Sexually transmitted infections among pregnant women attending an antenatal clinic in Fuzhou, China. *Sex Transm Dis* 2006;**33**:296–301.