

Full Length Research Paper

Seroprevalence of herpes simplex virus 2 infection among pregnant women in urban health training Yopougon-Attie (Cote D'ivoire)

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The seroprevalence of herpes simplex virus II (HSV2) was investigated from April, 2011 to May, 2012 among 170 pregnant women attending consultation in the urban health training Yopougon-Attie, Abidjan (Côte d'Ivoire). The anti-HSV2 immunoglobulin G (IgG) antibodies were detected by the principle of indirect enzyme-linked immunosorbent assay (ELISA) using the Diagnostic Automation ELISA[®] kit. Human immunodeficiency virus (HIV) serology was performed using rapid testing according to the national algorithm. Anti HSV2 IgG serology was positive in 96.5% (164/170) of women. HSV2/HIV coinfection was found in 6.7% (11/164) of parturients. No socio-epidemiological factor was related to the seroprevalence of HSV2 infection. Data from this study suggest a serological surveillance of pregnant women, in particular looking for a recent infection by assaying IgM or by real-time quantitative HSV DNA polymerase chain reaction (PCR). Indeed, the high prevalence of HSV2 in this population requires the implementation of a protocol in collaboration with the actors for the health of mother and child.

Key words: Pregnant, herpes simplex virus II (HSV2), seroprevalence, herpes simplex virus II-human immunodeficiency virus (HSV2-HIV) coinfection.

INTRODUCTION

Herpes simplex virus II (HSV2) is almost always sexually transmitted and is the common cause of genital ulcer disease worldwide (Westhoff et al., 2011). This infection causes during pregnancy the problem of neonatal herpes, a serious condition because of the high mortality and long-term neurological sequelae noted in about 20%

of survivors (Kim et al., 2012). HSV disease of the newborn can be acquired during one of the three time periods: in utero, perinatally, or postnatally. The most common mode of transmission is via direct contact of the baby with infected vaginal secretions during delivery (Thompson and Whitley, 2011).

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Pregnant women then become a target for surveillance of the infection in order to avoid the risk of neonatal transmission. Seroprevalence studies showed wide variations in infection rates by geographic location (Eskild et al., 2000). The highest prevalence of HSV2 has been found in some parts of Africa, America and the lowest in Asia. Globally, about 535.5 million were infected with HSV2 with an overall prevalence of 16.2% in 2003 (Biswas et al., 2011). In parts of Africa, it varies between 20 and 60% (20.3% in Tanzania (Yahya-Malima et al., 2008), 69.3% in Uganda (Munjoma et al., 2010)). No current data on HSV prevalence is available in Côte d'Ivoire. However, a direct study in 1997 had allowed the recovery of HSV2 antigen in genital secretions of 12.7% (Akoua-Koffi et al., 1999) of pregnant women. The viral isolation and direct immunofluorescence techniques were used.

Moreover, HSV2 is gaining special attention as a significant risk factor for acquisition of human immunodeficiency virus (HIV). It is assumed that infection with HSV2 disrupts the genital mucosa and provides a portal of entry for HIV, leading to increased susceptibility of HIV in HIV-negative persons (Biswas et al., 2011).

Sero-epidemiological information that can contribute to the monitoring of neonatal HSV2 infections is unrecognized in Côte d'Ivoire.

The aim of our study was therefore to determine the seroprevalence of HSV2 infection in pregnant women in Abidjan and assess the prevalence of HSV2-HIV coinfection.

MATERIALS AND METHODS

This study was a cross-sectional study that was conducted from April 2011 to May 2012. Recruitment of participants was done in urban health training Yopougon-Attié, located in Yopougon city at the north of Abidjan (the economic capital of Côte d'Ivoire). This town is one of the largest and most populous city of Abidjan, between 500 milles and one million inhabitants.

The analysis of samples was performed at the Laboratory of Bacteriology-Virology of the University Hospital of Yopougon and at the Serology Unit of the Institut Pasteur in Côte d'Ivoire.

Study population

Study participants, consisting of pregnant women, were recruited by simple random sampling as they presented to the urban health training Yopougon-Attié for voluntary counseling and testing for HIV infection.

At recruitment, all volunteers were interviewed, counseled and educated about the HSV2 prevalence study prior to enrolment. Acceptance of testing was an enrolment criterion. All volunteers gave informed consent for storage of their blood samples. A survey questionnaire was administered to each parturient for collection of data on socio-demographic characteristics, sexual exposure, medical history of sexually transmitted disease.

HIV detection

A fingerstick was taken for rapid HIV testing. Two tests were used

according to the national algorithm: A non-discriminating immunochromatographic test: Determine HIV-1/2 for the qualitative detection of anti-HIV-1 and HIV-2 antibody; A discriminant immunoassay test if determine is positive: Genie II HIV-1/HIV2 based on the specific detection of antibodies to HIV1 and HIV2 by antigens.

HSV2 serology

Specimen of 5 ml venous blood were collected from all the enrolled study participants in dry tubes and immediately kept at +4°C. Sera samples were separated on the same day and stored at -20°C freezer in aliquots until analyzed. Sera samples were subjected for HSV2 IgG detection using HSV2 IgG ELISA kit (Focus Diagnostic Automation, INC. Cat # 1403Z) as per manufacture's manual. The cut-off value used to determine a positive test on the kit was >1.00. Index value between 0.91 and 0.99 were considered equivocal, so were re-tested; and index values below 0.90 were considered negative as per the kit instruction manual.

Statistical analysis

Analysis of our data was performed using Excel ® and Epi Info software version 6.0. The data were analyzed using parametric methods. The comparison of our qualitative variables was made from χ^2 test. The threshold was set at 5%.

RESULTS

Epidemiological data

The age group from 20 to 30 years was the most represented. The average age was 26.2 years with a standard deviation of 5.6. Majority of the pregnant respondents had income generating activity to 63.5% (sewing, business, education), followed by housewives and students respectively at a rate of 15.3 and 11.2%. The illiteracy rate was 35.9%. More than half of the pregnant women, 63.5% cohabited. Pregnant women were surveyed at 60% in the second trimester of pregnancy. 2.9% were in consultation in the first trimester of the pregnancy.

In our series, 75% of the pregnant women who have already contracted between two and five pregnancies had less than two living children. The age of first sexual intercourse was between 15 and 20 years for 81.8% of pregnant women. 11.8% of participants had their first sexual intercourse before the age of 15. At the clinical level, 71.2% of the pregnant women said they had had a history of vaginal discharge. About one in two women ever experienced abdominal pain (59.4%) and genital pruritus (54.7%). 18.2% reported a history of genital ulcers.

Seroprevalence of HSV2 infection

164 of 170 women surveyed had a positive serology for HSV2, that is, a seroprevalence of HSV2 infection of

Table 1. Relationship between clinical history and herpes serology (n %).

Parameter		HSV2 Serology [n (%)]		P
		Absence of IgG	Présence of IgG	
Ulcerations	Absence (n=139)	5 (3.6)	134 (96.4)	0.66
	Présence (n=31)	1 (3.2)	30 (96.8)	
White vaginal discharge	Absence (n=49)	3 (6.1)	46 (93.9)	0.47
	Présence (n=121)	3 (2.5)	118 (97.5)	
Pruritus	Absence (n=77)	2 (2.6)	75 (97.4)	0.85
	Présence (n=93)	4 (4.3)	89 (95.7)	
Abdominal pains	Absence (n=69)	4 (5.8)	65 (94.2)	0.36
	Présence (n=101)	2 (2.0)	99 (98.0)	

Table 2. Relationship between sociodemographic characteristics and HSV2 serology (n %).

Parameter		HSV2 Serology [n (%)]		P
		Absence of IgG	Présence of IgG	
Age	<30 Ans (n=117)	3 (2.6)	114 (97.4)	0.57
	≥30 Ans (n=53)	3 (5.7)	50 (94.3)	
Profession	No activities (n=62)	3 (4.8)	59 (95.2)	0.79
	Active (n=108)	3 (2.8)	105 (97.2)	
Level of education	Level < secondary (n=103)	2 (1.9)	101 (98.1)	0.33
	Level ≥ secondary (n=67)	4 (6.0)	63 (94.0)	
Marital status	Single (n=39)	2 (5.1)	37 (94.9)	0.90
	Cohabiting+Married (n=131)	4 (3.1)	127 (96.9)	

96.5% among pregnant women in our study.

HSV2-HIV coinfection

The prevalence of HSV2-HIV co-infection was 6.7% (11/164). However, there was no statistically significant relationship between HSV2 infection and HIV. In addition, clinical history had no influence on the seroprevalence of HSV2 infection (Table 1). No period at risk for developing this infection was found. Indeed, no socio-demographic factor was related to the seroprevalence of HSV2 infection (Table 2).

DISCUSSION

Epidemiological data

The most represented age group in our population was 20 to 30 years. This age group is one of the most

sexually active. This result is superimposed on a study among semi-urban women in Kenya (Nyiro et al., 2011), where participants were young and were in the age group between 15 and 34 years.

In the survey, 11.8% of the pregnant women said they had their first sexual intercourse before the age of 15. Similar rates were found in the work of Pettifor et al. (2011) with 8% of women who reported having had their first sexual intercourse before the age of 14.

Moreover, it is clear that more than one in two (63.5%) in our study had an income-generating activity. Only 15.3% were housewives. This high proportion reflects a major change in the mindset of women, seeking to support and engaging in leading activities, no matter their level of education. Our results are different from those of Jindal's study where the majority of the study participants (61.2 %) were housewives (Jindal et al., 2012).

In our series, majority were in the second trimester of pregnancy (60% of respondents). A neighbor rate was found in a study among pregnant women in Northeast

India (Biswas et al., 2011). Within the enrolled subjects, 67% were in 3rd trimester of pregnancy. These results show that many pregnant women do not go early to their first prenatal visit.

The gravidity and parity were identified among all pregnant women. The results show a wide disparity between these two parameters. This reflects a large number of abortions or miscarriages. Similar to our result, multigravida was more (58.2%) than primigravida (41.8 %) in a study about the determination of prevalence of sexually transmitted infections (Jindal et al., 2012).

Seroprevalence of HSV2 infection

In our study, the seroprevalence of HSV2 infection among pregnant women was 96.5%. The prevalence rate is 14.5% among Mexican pregnant women (Herrera-Ortiz et al., 2013). Among Italian ones, it rotates around 7.6 and 8.4% (Jindal et al., 2012). In different parts of Africa, it varies between 20 and 60%, including 20.3% in Tanzania (Yahya-Malima et al., 2008), 49.1% in Zimbabwe (Munjoma et al., 2010) and 69.3% in Uganda (Nakubulwa et al., 2009).

This high rate reflects that many pregnant women have already been in contact with the virus HSV2 without having the ability to date the time of infection. As subclinical forms are found more, many patients carry antibodies without any memory of the initial herpes. The risk of transmission is higher in case of herpes lesions during primary infection or reactivation. In this context, the presence of ulceration, especially near term of pregnancy, should prompt the obstetrician to ask a herpes serology to confirm or refute the clinical diagnosis. This will have the advantage of earlier diagnosis and decision-making to improve the management and thereby reduce the risk of transmission to the newborn.

It is clear from our study that no socio-epidemiological factor (age, marital status, level of education) influences the seroprevalence of HSV2 infection. Similar results were found in other studies. Thus, in the study about genital herpes and cervicitis, it is found that age, gravidity, parity and history of STIs do not seem to influence positively the presence of HSV2 (Akoua-Koffi et al., 2004). On the contrary, Herrera-Ortiz et al. (2013) showed in his study that demographic factors (location of general hospital, age, education level, and civil status), and risky sexual behaviors (STI self-report and number of sexual partners during last year) were associated with HSV2 infection.

HSV2-HIV Coinfection

Eleven women in our study population were co-infected with HIV and HSV2, that is, a percentage of co-infection of 6.7%. Our study showed no relationship between

HSV2 infection and HIV status. In 2009, a study in Uganda of 250 pregnant women (Nakubulwa et al., 2009) showed that HSV2 infection was a risk factor for HIV seroconversion. However, epidemiological data showing an association between these two infections in Africa are few and limited to a few cross-sectional studies. It would be interesting to conduct studies on a larger sample to confirm the interaction between these two infections in Côte d'Ivoire. In fact, as genital herpes is an ulcerative STIs, HIV transmission could be due to a breach in the mucosa, facilitating the direct passage of the virus (Biswas et al., 2011).

Conclusion

This study identified a very high seroprevalence of HSV2 infection in pregnant women, reflecting its size in Abidjan and the prevalence of HSV2-HIV coinfection: 6.7%. The high neonatal transmission rate when ulcerations occur near the end of pregnancy, reinforces the fact that herpes serology should be requested from pregnant women in case of genital ulcers. Moreover, further studies with larger sample should be conducted by real-time quantitative HSV DNA PCR to determine the proportion of acute HSV2 infection in the population of pregnant women and estimate the rate of transmission to the newborn.

Ultimately, elimination of neonatal HSV requires the development of an effective HSV vaccine that will protect against genital HSV2 infection and disease.

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Conflicts of interest

The authors declare that they have no conflicts of interest.

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