

HTLV-1 and other viral sexually transmitted infections in antenatal and gynaecological patients in Ghana.

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Summary

Background: The study was undertaken to determine the prevalence of infection with Human T cell lymphotropic (leukemia) virus-1 (HTLV-1), Hepatitis B virus, Hepatitis C virus and Human Immunodeficiency Virus (HIV) in patients attending the antenatal and gynaecological outpatient clinics at Korle-Bu Teaching Hospital (KBTH).

Design: Prospective observational survey. Serum from each of the 517 participants was analysed for infection with Hepatitis B surface antigen with a latex agglutination test kit (Biotech Laboratories Ltd., Suffolk, United Kingdom), and tested for antibodies to Human Immunodeficiency Virus (HIV), Hepatitis C virus, and Human T cell lymphotropic (leukemia) virus-1 (HTLV-1) with SERODIA passive-particle agglutination assay kits (FUJIREBIO Inc., Tokyo, Japan). The results were compared with reports from other institutions.

Settings: The Obstetrics and Gynaecology outpatient clinics of the Korle-bu Teaching Hospital, Accra, Ghana. The virology Unit of the Noguchi Memorial Institute for Medical Research (NMIMR), Accra, Ghana.

Results: The prevalence of infection with Hepatitis B surface antigen (HBsAg) was 16.8%, Hepatitis C antibody 5.2% and HTLV-1 2.7%. Twelve (6%) out of 199 participants who gave informed consent tested positive for HIV antibody.

Conclusions: The study has demonstrated a high transmissible risk of HBV, HIV, HTLV-1, and HCV in Ghana and the necessity for antenatal screening for HBsAg to identify babies at risk of neonatal hepatitis B infection for appropriate intervention.

Key-words: HTLV-1, Viral-STIs, Korle-Bu Teaching Hospital, Antenatal, Ghana.

Résumé

Introduction: Cette étude a été effectuée afin de décider la prévalence d'infection avec virus lymphotrophique cellule T humaine (leucémie) (VLTH-1), virus Hépatite B, Virus Hépatite C et Virus Immunodéficientaire Humaine (VIH) chez des patients qui fréquentent service des

consultations externes anténatal et gynécologique du centre hospitalier universitaire du Korle-Bu (CHUK)

Plan: Sondage observationnel en perspective. Sérum de la part de chaque 517 participants étaient analysés pour l'infection avec antigène surface Hépatite B avec un équipement d'essai de l'agglutination de latex (Biotech Laboratoires Ltd, suffolk, royaume-Uni) et subi le test du dépistage des anticorps de virus immunodéficientaire humain (VIH), virus Hépatite C, et virus-1 lymphotrophique de la cellule T Humain (leucémie) (VLTH-1) avec SERODIAGNOSTIQUE équipement d'essai agglutination corpuscule passif (FUJIREBIO Inc, Tokyo, Japan). Les résultats ont été comparés avec des rapports des autres institutions.

Milieu/Cadre: Service obstétriques et gynécologiques des consultations externes du centre hospitalier universitaire, Accra, Ghana. Services de la virologie et d'Institut Mémorial de Noguchi pour des Recherches Médicales (IMNRM), Accra, Ghana.

Résultats: La fréquence de l'infection avec antigène de la surface Hépatite B (HbsAg) était 16,8%), anticorps Hépatite C 5,2% et VLTH-1 2,7%. Douze soit 6% parmi 199 participants qui avaient signalé du consentement avaient révélé positif pour le test du dépistage d'anticorps du SIDA.

Conclusion: Cette étude a démontré un risque transmissible du niveau élevé de VBH, VIH, VLTH-1, et VCH au Ghana et la nécessité de faire un test du dépistage anténatal pour HbsAg afin d'identifier des bébés au risque de l'infection d'hépatite B néonatale pour la prise en charge et une intervention nécessaire.

Introduction

This preliminary survey was undertaken to investigate the epidemiology and seroprevalence of Human T-cell lymphotropic (Leukemia) virus type I (HTLV-1) and other viral STIs in patients attending the antenatal and gynaecological clinics at the Korle-bu Teaching Hospital, Accra, Ghana.

With the increase in prevalence of most sexually transmitted infections (STIs), more people are becoming infected with severer forms of viral STIs including the human immunodeficiency virus (HIV), hepatitis B virus

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(HBV) and the human papillomavirus (HPV) among others. Because sexually transmitted infections are not notifiable in most African countries, most prevalence studies have been based on patients attending either family planning or antenatal clinics in urban areas, a situation that may in part account for the widely divergent results that have been reported by different researchers.

HBV; an important causative agent of liver diseases, is transmitted parenterally, following sexual intercourse and perinatally. Rarely transmission has followed bites from infected persons.² and it has been suggested that most horizontal transmission within families and among young children is due to inapparent parenteral exposure to saliva or blood.² Previous reports indicate that the quantity of virus in saliva and semen is usually one thousandfold less than that present in the blood, and presumably reflects leakage from the circulation and not viral replication at these sites.²⁸ Okada and colleagues³ reported that acute maternal HBV infection occurs in the third trimester and the presence of maternal HBeAg was associated with an increased risk of transmission of the virus to the newborn. In contrast it was observed that HBs antigenemia never developed in babies born to carrier mothers with serum anti-e.

HTLV-1 is the aetiologic agent of adult T-cell leukemia,⁴ a degenerative neurological disease known as tropical spastic paraparesis in Africa and the Caribbean,⁵ and HTLV-1 associated myelopathy in Japan.⁶ Current estimates are that 15-20 million individuals are infected by HTLV-1, and most of the cases have been described in highly endemic areas such as southern Japan, inter-tropical Africa, the Caribbean and surrounding regions.⁷ This is in contrast with the low HTLV-1 seroprevalence rates usually observed in non-tropical areas.⁸

Similar to HIV and other viral STIs, the natural transmission of HTLV-1 occurs vertically from mother to child, principally through breastfeeding and horizontally from husband to wife. Hino and co-workers⁹ have shown that about 60 percent of children born to mothers with HTLV-1 antibody titres of 256×10^3 or higher were carriers, and that antigen positive mothers were less frequent among those with titres less than 4000.

HCV is a blood-borne virus that generally circulates in low titers in infected serum, and sexual and vertical transmission of HCV is less common compared to HBV.³ Previous reports indicate that prior to serological screening of blood donors, HCV was the cause of over 90 percent of post-transfusion hepatitis and again accounted for the high incidence of chronic hepatitis in haemophiliac patients.¹⁰

Previous reports of Acquired Immune Deficiency Syndrome (AIDS) patients indicate the occurrence of antibodies to the HTLV-1,²⁰ and several of the antibody positive individuals were noted to be intravenous drug abusers.¹¹

Patients and methods

The study was carried out between November 2000 and December 2001 on patients attending the gynaecological and antenatal clinics of the Korle-Bu Teaching Hospital, a 1600 bed facility for the University of Ghana Medical School in Accra, the capital city of Ghana. It is the largest hospital in the country.

Five hundred and seventeen newly registered patients who gave informed consent were enrolled consecutively into the study. Three patients declined participation.

A standardized questionnaire was administered by trained STI nurse/counselors. The age, ethnic origin, marital status, educational background and obstetric history of each participant were recorded. At the end of the consultation five milliliters of venous blood was collected by venipuncture from each of the 517 participants, labeled, and transported in coolers to the Virology Unit of the Noguchi Memorial Institute for Medical Research for serology.

Pathogen identification:

The venous blood was separated on the same day and the serum tested for HBsAg with a latex agglutination test kit (Biotech Laboratories Ltd., Suffolk, United Kingdom) and analysed for antibodies to Hepatitis C virus, HTLV-1 and HIV with SERODIA passive-particle agglutination assay kits, (FUJIREBIO Inc., Tokyo, Japan). HIV antibody was tested for 199 patients who gave informed consent. Qualitative testing protocols were applied according to the manufacturer's instructions and the cut off serum dilutions were 1:16 for HTLV-1, 1:32 for HIV and HCV.

Because of the difficulty in obtaining consent, HIV test was omitted after the first 199 patients. Patients who tested positive for the HIV were referred to the designated "Fevers Unit" of the hospital responsible for the management of HIV positive patients.

Ethical Review of Research committee of the University of Ghana approved the study.

Statistical analysis

The frequency data were analyzed by chi-square or Fisher's exact tests using EPI-Info 2002 software (CDC, Atlanta, USA). *P* value < 0.05 was considered statistically significant.

Results

A total of 517 women were recruited into the study. The age groups and marital status of the participants are shown in table 1. The age and marital status of 17 patients were not recorded. The mean age was 29.6 (SD=6.9). Four hundred and one (77.6%) patients were aged thirty-five and below with 28 (4.2%) above 41 years. Four hundred and thirty two (86.4%) participants were married, 44 (8.8%) were single and the rest were either widowed or divorced. A total of 315 (62.9%) participants had

Table 1 Age groups and marital status of subjects

	Married	Divorced/		Total
		Widowed	Married	
16-20yrs	24		9	33
21-25	104		20	124
26-30	133	5	6	144
31-35	90	5	5	100
36-40	62	5	4	71
41+	21	7		28
Total	432	22	44	500

* 17 patients who didn't present information on marital status or age are excluded

secondary school education while sixty (12%) had no formal education. Aside from fifteen patients who did not provide information on parity, 300 (59.8%) of the patients had one or more children.

Table 2 shows the prevalence of the various infective agents by pregnancy status. There was statistically significant association between Hepatitis B infection and pregnancy status. The prevalence rate of HBsAg in the pregnant and non-pregnant patients was 13.3% and 21.5% respectively (chi-square 6.2; $p < 0.01$). There was a significant association between the presence of Hepatitis C antibodies and HTLV-1 (Fisher's exact test; $p < 0.01$).

Table 3 shows the age distribution and seroprevalence of the various pathogens. The 26-to-30 year age group that included 44 (28.7%) patients was the largest infected group, followed by the 21-to-25 year age group with 126 (25.1%) patients. The forty-one year and above age group was the smallest with 28 (5.6%) patients, after the 16-20 age group with 33 (6.6%) patients.

Twelve out of the 199 patients tested positive for HIV. Forty two percent (5/12) of the HIV seropositive

Asia and Africa, 10 to 20 percent of adults may be HBsAg positive.² This is in contrast with the 0.4 percent HBs antigenemia found in volunteer blood donors in New York City.¹²

The 16.8 percent (87/517) HBV seroprevalence rate indicated by the HBsAg seropositive test is consistent with previously reported levels of 15.8 percent and 15.0 percent among Ghanaian children¹³ and blood donors¹⁴ respectively. HBV seroprevalence was the highest observed in this study and agrees with results of previous studies of sexually transmitted infections when HBV and *T. pallidum* were noted as the most frequently occurring pathogens.¹⁵ In general, the high HBV seroprevalence is certainly alarming and has important health policy implications. The report that carrier mothers with anti-e in their serum do not transmit HBV to their infants raises the possibility of using anti-e as a prophylactic measure to prevent maternal transmission of HBV.³ Similarly, Kohler et al²⁶ succeeded in preventing vertical transmission of HBV from four mothers with HBs antigenemia, including two asymptomatic carriers by the administration of anti-HBs. We were unable to explain with our data the significantly low prevalence of HBV in our pregnant women (13.5 percent) than in gynaecological patients (22.5 percent). Further research is required to confirm the findings and provide explanation. Analysis for association between HBV and other variables on sexual activity such as number of new sexual partners in the last 4 weeks, frequency of sexual intercourse per week, number of sexual partners in the past 12 months, and infection with other STIs did not establish a meaningful association. The screening seroprevalence of anti-HTLV-1 antibody in this study was found to be 2.7 percent. This contrasts the reported HTLV-1 prevalence of 0.7 percent among male blood donors in the same hospital.¹⁴ Early

Table 2 The prevalence of viral pathogens by pregnancy status

	Pregnant (%)		Non-pregnant (%)		Total prevalence (%)	
HIV	4/97	(4.1)	8/102	(7.8)	12/199	(6.0)
Hepatitis B surface antigen*	39/294	(13.3)	48/223	(21.5)	87/517	(16.8)
Hepatitis C antibody	15/294	(5.1)	12/223	(5.4)	27/517	(5.2)
HTLV-1 antibody	8/294	(2.7)	6/223	(2.7)	14/517	(2.7)

individuals also tested positive for HBV, 17% (2/12) for HCV, 8% (1/12) for *C. trachomatis*, 8% (1/12) for *T. vaginalis* and 33% (4/12) for *C. albicans*. None of the HIV positive patients tested positive for *N. gonorrhoea* or *G. vaginalis*.

Discussion

Significant differences exist between the various regions of the world in terms of the prevalence of HBV infection.^{3, 12} It is estimated that in regions of Southeast

seroepidemiological reports highlighted the high prevalence of HTLV-1 infection in Africa¹⁵ and the Melanesia.¹⁶ Most of the reports, however, were based only on first-generation enzyme-linked immunosorbent assay (ELISA) tests which have been shown to be sensitive but not specific for detection of HTLV-1 antibodies.¹⁷ The observed prevalence rate in our study might have been influenced by the existence of cross-reactivity between HTLV-1 & II and HTLV-1 p19 Gag protein and malaria-derived antigens⁷ Mahieux and

Table 3 Age distribution and seroprevalence of HBsAg HCV Ab, HTLV-1 Ab, and HIV, in patients.

Age group (yr)	No of patients (%)	HBsAg (%)	HCV Ab (%)	HTLV-1 Ab (%)	HIV Ab/184 (%)	Total no.of infections
16-20	33 (6.6)	3 (9.1)	1 (3.0)	2 (6.1)	0/15 (0.0)	6
21-25	126 (25.1)	19 (15.1)	5 (4.0)	3 (2.4)	3/51 (5.9)	30
26-30	144(28.7)	27 (18.8)	7 (4.9)	4 (2.8)	3/55 (5.5)	41
31-35	100 (19.9)	13 (13)	7 (7.0)	1 (1.0)	1/32 (3.1)	22
36-40	71(14.1)	17 (23.9)	5 (7.0)	3 (4.2)	2/19 (10.5)	27
41+	28 (5.6)	8 (28.6)	2 (7.1)	1 (3.6)	3/12 (25.0)	14
Total	502	87 (17.3)	27 (5.4)	14 (2.8)	12/184	140

colleagues⁷ have demonstrated positive correlation between HTLV-1 optical density values and titers of antibody to *Plasmodium falciparum*. Other researchers have reported increased HTLV-1 population seropositivity with increasing age in both sexes with a statistically significant increased prevalence among females.¹⁸ Our study did not show increasing HTLV-1 population seroprevalence with increasing age. The 26-to-30 year age group was the largest infected group in contrast with an earlier report that showed the age group 21-to-25 to be the largest.¹⁴

Previous authors have reported association between HTLV-1 antibodies, HIV and HCV infections and 19 percent of the dual infections in one study involved HTLV-1: one case with HIV and three cases with HCV.¹⁹ Robert-Guroff et al.²⁰ in a study of AIDS patients, reported dual infection with HTLV-1 and observed that several of their antibody-positive individuals were intravenous drug abusers. Our study showed a significant association between HTLV-1 and HCV. There was no dual infection with HTLV-1 and HIV and none of our patients admitted intravenous drug abuse. The prevalence of HTLV-1 was significantly higher in HCV positive patients (14.8 percent) than in HCV negative patients (2 percent).

The report of Hino and colleagues⁹ has shown that refraining from breast-feeding by carrier mothers with high titres of HTLV-1 antibody (>4000) is a practical, and currently the only available measure to break the endemic cycle of HTLV-1 infection and thereby reduce the number of future adult T-cell leukemia patients.

Most studies have shown that pregnancy does not have a major adverse effect on the natural history of HIV infection in women,²¹ the exception being that HIV infected pregnant women were noted to be significantly more likely to develop bacterial pneumonia than their never-pregnant controls.³¹ This notwithstanding, AIDS has become a leading cause of maternal mortality in many African countries, a situation which does not appear to be due to pregnancy-induced acceleration of the HIV-related conditions but that more women with advanced disease are becoming pregnant.²²

In Kenya, Malawi, Namibia, Rwanda, South Africa, The United Republic of Tanzania, Zambia, and Zimbabwe, over 10 percent of women attending antenatal clinics in urban

areas are HIV-positive, with rates of almost 60 percent in some sites.²³ Adverse pregnancy outcome such as increased rates of spontaneous early abortion, low birth weight babies, stillbirths, pre-term labour, preterm rupture of membranes and mother to child transmission of HIV have been reported.²³

Twelve out of 199 (6 percent) patients in our study were HIV seropositive, and of this number four (4.1 percent) were pregnant. This compares with the reported 3.8 percent HIV seroprevalence among blood donors.¹⁴

The anti HCV seroprevalence in this study was 5.2 percent and compares favourably with other reports on anti-HCV seroprevalence determined by screening assays that found seroprevalence rates of 5.4 percent in children,¹³ 2.8 percent in adults²⁴ and 5.2 percent in blood donors²⁵ This study has described the status of infection with viral STI pathogens in gynaecological and Obstetrics patients during the study period in a tertiary hospital. It has demonstrated the rather high transmissible risk of HBV, HIV, HTLV-1, and HCV in Ghana. It has further demonstrated the necessity for antenatal screening for HBV infection to identify babies at risk of neonatal hepatitis B infection for appropriate intervention. Further research is required to determine the prevalence of HTLV-1 specific antibody in our pregnant women and confirm the statistically significant difference in prevalence of HBV infection in pregnant and non-pregnant patients.

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