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HCV and HIV Co-Infection in Pregnant Women Attending St. Camille Medical Centre in Ouagadougou (Burkina Faso)

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Five hundred and forty-seven pregnant women with less than 32 weeks of amenorrhoea, attending an antenatal clinic of St. Camille Medical Centre (SCMC) of Ouagadougou were enrolled for a hepatitis C virus (HCV) and HIV co-infection study. Fifty-eight (10.6%) were HIV positive and 18 (3.3%) were anti-HCV positive. Only seven pregnant women (i.e., 1.3%) had a documented HIV and HCV co-infection. HCV-RNA was found in 5 out of 18 (27.8%) patients, who had anti-HCV antibodies. The genotype analysis of these five patients showed that two were of 1b whereas three were of 2a genotype. Mother-to-infant transmission of the same HCV genotype (2a) was documented in only one case. High 1b prevalence has been reported in other parts of Africa, while 2a is the prevalent genotype (60%) in Burkina Faso. This genotype has a higher response rate to treatment. Serum transaminases were normal, also in presence of HCV-RNA. The higher than expected rate of co-infection in Burkina Faso seems to demonstrate a correlation between these two infections, which could influence the evolution of HIV and HCV diseases.
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KEY WORDS: HCV; HIV; co-infection; pregnancy; Burkina Faso

INTRODUCTION

Whereas the epidemiology of hepatitis B (HBV) and HIV is well known in sub-Saharan countries [Kiire, 1996], the epidemiology of the hepatitis C virus (HCV) is hardly documented [Sarkodie et al., 2001]. The number of individuals infected by HCV worldwide is estimated to be over 170 million [Cohen, 1999; Leyssen et al., 2000]. The infection becomes chronic in about 85% of individuals and 20% of them develop severe complications such as cirrhosis [Bismuth et al., 1992] and hepatocellular carcinoma [Di Bisceglie, 1997]. In Africa more than 30 million people could be infected and 6–12 million could be chronic carriers [Madhava et al., 2002]. In Burkina Faso the frequency of anti-HCV among blood donors is about 2.5% [Nicot et al., 1997], whereas in other parts of Africa anti-HCV prevalence varies from 2% to 15.9% with a zone of high endemia in Central Africa [Madhava et al., 2002]. HIV infected (7.2%) African population lives in Burkina Faso, where 8% of pregnant women are HIV positive [Ilboudo et al., 2003]. Since HCV shares the same transmission routes as HIV, co-infection with these two viruses could be frequent [Cropley and Main, 2000]. For example, approximately one third of HIV positive subjects in USA are also HCV positive and the co-infection is associated with a higher rate of HCV viraemia [Bonacini and Puoti, 2000; Brau et al., 2002]. It has to be stressed that in USA heterosexual transmission appears to be less common and that co-infection is mainly detected in intravenous drug users with some recent concerns regarding higher seroprevalence level in men who have sex with men. If, on one hand, triple drug therapy manages to control HIV infection nowadays, on the other hand, it is imperative to know the impact of HCV infection on the exposed populations as well as the possible associated morbidity. Moreover, in all HCV and HIV co-infected women, the infection is transmitted vertically from mother to infant

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[Gibb et al., 2000]. The influence of HIV seropositivity on the risk of HCV transmission ranges from 3% to 20%, when the mother is either seronegative or HIV seropositive [Granovsky et al., 1998]. The prevalence of anti-HCV among pregnant women is 0.2%–7% in Africa; however, the frequency of anti-HCV positive pregnant women, the rate of co-infection, the influence of HIV on HCV, and vice versa are unknown in Burkina Faso.

The goal of this study was to specify the prevalence of HIV and HCV pregnant women attending the St. Camille Medical Centre (SCMC) of Ouagadougou (Burkina Faso) and to establish the rate of co-infection and vertical transmission in this area.

PATIENTS AND METHODS

Patients

Out of 3,314 pregnant women, who required prenatal attention at the antenatal clinic at the SCMC of Ouagadougou during the period from December 10, 2001 to July 10, 2002, we selected randomly 547 (16.5%) pregnant patients aged 18–44 years (mean age 25.9 ± 5.8). All these patients had less than 32 weeks of amenorrhoea at the time of recruitment. All pregnant mothers, applying to this institution, were offered a combined HCV and HIV test during the 7 months of this study. Each patient signed an informed consent form before being bled; the study was also approved by the Ethics Committee of the CMSC. All the selected patients were informed confidentially of the results of the present study. The acceptance was high (99%) and the examined sample 547/3314 (16.5%) was sufficiently representative; therefore, the results of this study may be considered an unbiased seroprevalence of HCV and HIV in the SCMC. HIV positive mothers were visited and their blood samples were collected for CD4 measurement. Antiretroviral therapy and a nevirapine protocol were offered to all the HIV positive mothers to prevent mother-to-infant transmission.

Methods

Blood samples were collected in EDTA tubes and centrifuged at 3,000 rpm for 10 min. Plasma was separated and frozen at -40°C. An anti-HIV antibodies test was carried out in 547 women by using the Biorad[Q1]-Genie II Rapid Test. All positive samples were doubly tested by enzyme immunoassay (EIA), using the Abbott IMX System, in order to confirm the HIV positivity. Anti-HCV antibodies were measured in all samples by an EIA technique (Radim House, Italy) by using a micro plaque spectrophotometer reader by Sirio S (Seac, Italy); a confirmatory test was repeated in samples that were positive to the anti-HCV test performed by INNO-LIA HCV Ab III (Innogenetics, Belgium). Samples that were positive when tested by EIA and negative when tested by INNO-LIA HCV Ab III were assumed to be false positives. Liver function tests (transaminases, bilirubin) were performed in the anti-HCV positive mothers. HCV-RNA was measured through the RT-PCR HCV-RNA Amplicor test (Roche, Switzerland) in those samples that had been confirmed to be anti-HCV positive; the genotypes were also determined by the Trugene HCV 5′NC genotyping test (Visible Genetics, USA). The characteristics (age, work, social status, marriage, number of previous pregnancy) of women were collected by a nurse with informed consent.

If the women knew their HIV status from previous medical consultation, they were asked to provide all documentation about the mode of infection. The HIV positive women were enrolled to the Prévention De La TransmissionMère–EnfantDuVIH/SIDA(PTME) program adopted by SCMC and the newborns were submitted to the nevirapine protocol [OMS, 2001]. A blood sample was collected from the newborns of women, who turned out to be positive to the INNO LIA HCV Ab III test 2 days after birth to determine HCV-RNA as well as to compare the HCV genotype of both mother and infant. Children of anti-HCV positive mothers were tested at 6 months for transaminase and anti-HCV determinations, while children of HIV or HCV/HIV positive mothers were monitored for a period of 18 months.

RESULTS

The mean age of the women studied in the present work was 25.9 ± 5.8 years (range: 18–44 years). The distribution for each age class was: 140 (25.6%), aged below 20 years; 322 (58.9%), aged between 20 and 30 years; 85 (15.5%) aged above 30 years.

Fifty-eight (10.6%) women were HIV positive and 28 (5.1%) HCV positive to the anti-HCV EIA test. Only 18/28 (3.3%), who were positive for the anti-HCV EIA test were also positive by INNO-LIA HCV Ab III test (see Table I). HIV and HCV co-infection was documented (rate of co-infection 1.3%) in seven pregnant women only. This value is higher than the expected rate of co-infection, which is estimated to be 0.348 if the two infections (HIV and HCV) are independent. The percentage of false positives ranged from 38% to 29% in the different classes of age (<20, 20–30, >30 years old); however, this difference was not statistically significant ($\chi^2 = 0.044$, $P = 0978$).

The mean age of confirmed HCV positive women was 25.1 years and that of HIV positive women 28.9 years. The ages did not differ significantly from that of women, who were both HCV and HIV negative. Other characteristics of pregnant women in relation to their serological status are reported in Table II. Mothers 543/547 (99.3%) were married, 246/547 (45.0%) had received at least one blood transfusion during their life;

TABLE I. Anti-HCV and Anti-HIV in 547 Pregnant Women in Ouagadougou

Serological tests	EIA positive	INNO-LIA confirmed	Percentage
Anti-HCV	28	18	3.3
Anti-HIV	58		10.6
Anti-HCV + Anti-HIV	9	7	1.3

TABLE II. Characteristics of Studied Women at the Antenatal Clinic of St. Camille Medical Centre (SCMC)

	HCV positive n = 18 (%)	HIV positive n = 58 (%)	HCV/HIV positive n = 7 (%)	HCV/HIV negative n = 464 (%)	Total 547
Own home work	16 (88)	52 (90)	1 (14)	414 (89)	483
Out office work	2 (11)	6 (10)	6 (86)*	50 (11)	64
Married	18 (100)	58 (100)	7 (100)	460 (99)	543
Not married	—	—	—	4 (0.8)	4
Previous pregnancy	13 (72)	40 (69)	7 (100)	330 (71)	390

*$\chi^2 = 30.159$, $P < 0.0001$.

none of them reported sexual intercourse at risk, 483/547 (88.3%) worked at home, and 390/547 (71.3%) had previous pregnancies. Only 1/7(14.3%) HCV/HIV positive women were housekeeper (see Table II).

HCV-RNA was found in 5/18 (27.8%) women with anti-HCV. All HCV-RNA positive mothers were HIV negative. The genotype analysis showed that two were 1b and three were 2a genotype (see Table IV[Q2]). Vertical transmission of HCV was documented and the genotype 2a was also isolated in the second day of life in both mother and infant in one case only.

The liver function tests were negative in all anti-HCV positive mothers and as was the case in HCV-RNA positive mothers. The children of anti-HCV positive mothers had normal liver function tests, when tested at 6 and 12 months. Also, in the infant where vertical HCV transmission occurred, the liver function tests were negative and HCV-RNA was no longer detected in the serum, 6 and 12 months after birth. No HIV vertical transmission was detected in any of the children who were being treated according to the nevirapine protocol.

DISCUSSION

The frequency of HIV in pregnant women in Ouagadougou is higher (10.6% vs. 7.1%) than that of the overall population living in Burkina Faso. Also, the frequency of anti-HCV is higher (3.3% vs. 2.5%) than that reported for blood donors. Co-infection with HIV and HCV affects 1.3% of the pregnant women investigated in the present study; this value is lower than that found (3%) in a similar study conducted in Spanish pregnant women [Munoz-Almagro et al., 2002]. USA veterans (many of whom were using drug during the Vietnam war and were exposed to infection), currently living in New York, have a co-infection rate of 24.8% [Brau et al., 2002]. These differences point out the different mode of transmission between veterans and pregnant women, and also among pregnant women from different countries. The prevalence of anti-HCV in Burkina Faso is relatively high if compared with analogous studies carried out for the entire population of African countries such as Somalia 0.6% [Nur et al., 2000], Maroc 1% [Cacoub et al., 2000], Eritrea 1.4% [Ghebrekidan et al., 1998]. Nevertheless, studies in other parts of Africa report higher frequencies in Egypt [Arthur et al., 1997], in Gabon [Delaporte et al., 1994], and even higher (>10%) in Burundi [Ntakarutimana et al., 1995] and in Kenya [Ntakarutimana et al., 1995]. The variable frequency of anti-HCV in different African countries unexpectedly corresponds to the unusual association between HCV and HIV in Africa (see Table III[Q3]).

A noteworthy result is the low percentage of HCV-RNA (5/18, 27.8%) among anti-HCV positive women; in fact in both Europe and USA more than 80% of anti-HCV positive women show HCV-RNA. This seemingly anomalous result may be accounted for by the low replication of 2a genotype, which is prevalent in Burkina Faso.

The difference between expected versus observed HIV and HCV confected individuals suggests a different mechanism of transmission. In fact, in our study the ratio between HIV infected woman and the HCV infected group is 7/18 (38.9%), which is significantly higher ($P = 0.09$) than the ratio between HCV infected women and the HIV infected group 7/58 (12.1%). The high HIV/HCV co-infection rate among the pregnant women being followed by the SCMC, which is still lower than that reported for Western countries [Bonacini and Puoti, 2000; Cropley and Main, 2000; Brau et al., 2002], suggests different modalities of transmission of these pathologies: sexual and through blood transfusions, reusable needles, traditional healers, or medical and surgical interventions. When the parenteral route prevails (as, for example, in Maroc, Egypt, and Gabon) the probability to contract HCV is larger, even though the parenteral route is clearly a potential one of the HIV transmission. On the contrary, when the transmission way is prevalently related to sex, the probability to acquire HCV is lesser than the probability to acquire HIV. In fact countries, such as Kenya and Burkina Faso, that have a higher HIV infection prevalence also have a relatively lower estimated HCV prevalence.

The conclusion that in Ethiopia anti-HCV prevalence does not differ between HIV negative sex workers and women population [Munoz-Almagro et al., 2002], is in sharp contrast with the important role of sexual transmission of HCV in these populations. In fact, an individual may first acquire HIV sexually and then be infected with HCV through unsafe medical practices, traditional healers, when treated for an HIV-related illness. Although sexual transmission rates are far from well documented in developing countries, in this part of Africa the sexual transmission of HCV seems infrequent and less efficient [MacDonald et al., 1996].

The frequency of mother-to-infant HCV transmission, reported in the literature ranges from 4% to 12%; is 3.8 times higher in the case of co-infection with HIV, which is characterized by a mother with very high HCV

viremia [Conte et al., 2000]. The transmission rate does not seem be related to the viral genotype: all our HCV-RNA positive mothers were HIV negative. The role of the mode of delivery remains controversial. Some authors claim that the mode of delivery does not play any role in the transmission [Resti, 1999], while others claim that Caesarean delivery could have a protective effect [Conte et al., 2000]. The present study shows that out of the anti-HCV positive 18 mothers only five had a Caesarean delivery and out of these only one was HCV-RNA positive. Also, the role played by breast-feeding, which is of vital importance in poor countries such as Burkina Faso, is not entirely clear. Studies carried out in other parts of Africa support the high genetic diversity of 1 and 2 HCV genotypes [Jeannel et al., 1998] and indicate that type 2 slightly prevails over type 1 (59% vs. 41%). In fact in Burkina Faso the contribution of HCV to liver disease does not seem as severe as in other parts of Africa. In these countries blood transfusion together with traditional healers and reusable needles are frequent routes of transmission within the urban population [Halim et al., 2001]. In Burkina Faso, the HCV virus shows a low pathogenicity both in the overall population and in the group of pregnant women, and the prevalent genotype is confined to 2a, known for its higher response rate to treatment [Pawlotsky, 2003].

We do not know the influence of HIV on the evolution of HCV and vice versa, but the high rate of co-infection in Burkina Faso (1.3%) demonstrates a correlation between these two viral infections which could influence the morbidity and mortality [Tedaldi et al., 2003].

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