Original Article

Hepatitis B Virus, Hepatitis C Virus and Human Immunodeficiency Virus Infections among Pregnant Women in Central Sudan

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ABSTRACT

Background: The epidemiology of viral hepatitis and Human immunodeficiency virus (HIV) during pregnancy is of great importance for health planners and program managers. However, few published data on viral hepatitis and HIV are available in Sudan especially during pregnancy.

Objectives: The current study was conducted to investigate seropositivity of hepatitis B, hepatitis C, and HIV among pregnant women in central Sudan.

Materials and methods: A cross sectional study was conducted where 396 pregnant women were investigated for the presence of hepatitis B, C and HIV. Enzyme linked immunosorbent assay (ELISA) was used to detect HBsAg and anti-HCV. Antibodies to HIV were detected by three different methods as per Strategy III of the National AIDS Control Organization by utilizing different systems of testing to make a diagnosis of HIV.

Results: Twenty (5.1%), five (1.3%), and six (1.5%) women were seropositive for HBsAg anti-HCV antibodies and HIV, respectively. One (0.003 %) woman was seropositive for both HBsAg and anti-HCV antibodies. While age, parity, were not associated with seropostivtiy of HBsAg, home delivery was the only significant risk factor for seropostivtiy of HBsAg (OR=4.5 (95% CI=1.2-16.7)

Conclusion: Prevalence of HBV and HCV among pregnant women in this setting is in the intermediate zone of endemicity. This is alarming and should draw medical authorities' attention if vertical transmission is to be reduced.

Key words: Sudan, hepatitis B, hepatitis C, HIV, seropositivity, Pregnancy.

Hepatitis B and hepatitis C viruses are the most important causative agents of transfusion-associated hepatitis. Hepatitis B and C virus infections during pregnancy are potential for vertical transmission [1-3]. It is estimated that about ten percent of newborns to women infected with acute HBV infections in the first trimester of pregnancy are HBsAg-positive at birth and 80 to 90% of newborns become HBsAg-positive without prophylactic therapy on development of acute maternal infection during the third trimester of pregnancy [4-6].

The vast majority of neonatal HBV infections result from intra-partum exposure to infectious blood and vaginal secretion; while the remaining 15% are a result of haematogenous trans-placental viral spread [5]. Published data on hepatitis C virus (HCV) infection among pregnant women in Sudan is scarce. The seroprevalence of anti-HCV antibody among the general population of Sudan is 2.2-3%; its prevalence among pregnant women was 0.6 % [7-9]. Large scale studies to estimate the prevalence of HCV infection or the risk behavior of HCV infection in the low-risk Sudanese population are waiting to be carried. Nonetheless, overall, the probable risk is 3-10% percent, with the risk being higher among certain subgroups, such as women who are co-infected with human immunodeficiency virus (HIV) [10-13]. HIV infection can be transmitted from an infected mother to her fetus at any of the following stages; during pregnancy, during delivery, or by breastfeeding. This fact makes out of this form a potent form of HIV transmission in developing countries, where

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the proportion of infected women to infected men is 1:1, its prevalence in Sudan is around 0.4% among the general population [14]. A number of risk factors are associated with hepatitis transmission including sexual contact, perinatal infection, blood and blood products, hemodialysis, intravenous and percutaneous drug use, occupational, habitual, and social behavior [15]. The current study was conducted to investigate the prevalence of HCV, HBV and HIV infection among pregnant women at Wad Madani hospital, Sudan. This data will help health planners to develop vaccine and screening assemblages in antenatal care clinics.

MATERIALS AND METHODS:

A cross sectional study was carried during the period June through December 2011. Participants were women with a singleton baby while those with antepartum hemorrhage, hypertension and diabetes mellitus were excluded.

Sample size was determined based on single sample size estimation [16] with the formula $n = Z^2P(1-P)/d^2$. The value of p was taken from our previous study conducted on the prevalence of HBV among pregnant women as 5.6% (0.056) [9] with the precision of 2.8%. There for the sample size was 259+ 10 %(26) =285. Ethical approval was obtained from Sudanese Medical Specialization Board Ethical Committee. The participating women were counseled and written informed consents were obtained from them before collecting socio-demographic and clinical data (age, primiparity, level of education, home delivery, vaginal delivery, history of surgery, or history of blood transfusion, occupation, history of jaundice) using a pretested questionnaire.

The collected samples were tested for hepatitis B (HbsAg), hepatitis C, and HIV as per Strategy III of the National AIDS Control Organization by utilizing different test systems to establish the diagnosis of HIV. The sera were then checked immediately for HBsAg and anti-HCV using ELISA kits. The Axsym HBsAg version 2.0 kits (Abbott, N. Chicago, IL) were utilized to demonstrate HBsAg levels. Nonreactive samples were regarded negative for HBsAg and not tested further, while reactive samples were rechecked for result confirmation. Consistently reactive samples were considered positive and not checked further. The Axsym HCV version 3.0 kits (Abbott) were used to test for anti-HCV antibody levels. Nonreactive samples were regarded negative for HCV; whereas reactive samples were rechecked for result confirmation and consistently reactive samples were considered positive.

Serum specimens were initially checked for antibodies to HIV (anti-HIV) using Bio-Line (Standard Diagnostics, South Korea). Confirmation of reactive specimens was further done by Uni-Gold (Trinity Biotech, Ireland) and Colloidal Gold (Shanghai Kehua Bioengineering, China) test kits.

Statistics:

Data were entered in computer using SPSS (version 19.0) for analysis. Means and percentages were calculated and compared between the seropositive and seronegative HBV using chi-square test. Univariate and multivariate analysis were performed using sero-positive for HBsAg as the dependent variable and socio-demographic and clinical variables (age, primiparity, level of education, home delivery, vaginal delivery, history of surgery, or history of blood transfusion, occupation, history of jaundice), as independent variables. A P value of <0.05 was considered significant.

RESULTS:

The mean age of the patients was 29.7 and most of the patients were in the age group 20-40 years. Table 1 shows the demographic features of the study group. Twenty (5.1%), five (1.3%), and six (1.5%) women were seropositive for HBsAg anti-HCV antibodies and HIV, respectively. One (0.003 %) woman was seropositive for both HBsAg and anti-HCV antibodies. In the univariate analysis vaginal delivery, parity and home delivery were associated with HBsAg seropostivitiy, while in multivariate analysis, home delivery was associated with HBsAg seropositivity (Table 2).

Table 1: Sociodemographic characteristics of pregnant women attending Wad Madani maternity hospital, Sudan

Variables	
	The mean (SD) of
Age, years	29.7±7.38
Parity	1.8±0.63
	Number (percentage) of
Educational level ≤ secondary	300(75.76)
Urban residence	7(1.77)
Married	370(93.43)
Employed	47(11.87)
History of Blood transfusion	9(2.27)
Surgical operations	227(57.32)
History of miscarriage	99(25)

DISCUSSION:

This study showed HBsAg seroprevalence rate of 5.1% among antenatal women, which is more or less similar to the rate (5.6%) that we previously reported among pregnant women at Khartoum [9]. Yet this rate is higher than the rates observed from the nearby Libya (1.5%) and Egypt (4%) [17,18]. Perhaps the differences in the prevalence rate could be explained by effect of vaccination that employed there earlier than in Sudan. Interestingly we recently observed much high prevalence of HBsAg (10.8%) among pregnant women at Sana`a, Yemen [19]. Thus, the high prevalence of HBV justifies the antepartum serum HBsAg screening if vertical transmission and acute or chronic HBV infection in pregnant women is to be prevented/ reduced [20]. Through the screening of HbsAg, previously unsuspected chronic HBV infection in young, otherwise healthy, individuals can be revealed. This screening has the added advantage of making it possible to refer such patients for appropriate antiviral therapy before significant liver damage and associated functional insufficiency ensues.

The anti HCV prevalence of 1.3% in the current study is high compared to the rate that we previously reported (0.6%) among pregnant women at Khartoum [9]. The difference could be explained by the difference in awareness concerning sexually transmitted diseases between the two populations studied. In the nearby Egypt the prevalence of HCV among pregnant women was much higher (8.6%) [21].

During the study period, 396 pregnant women were screened for HIV, where 1.5% (n = 6) tested positive for HIV, which is higher than the prevalence among antenatal women in Sudan as we previously observed [22] and slightly higher than what has been found by Mohammed et al [23].

Table 2: Factors Associated with HBsAg among Pregnant women at Wad Madani Hospital, Sudan Using Univariate and Multivariate Analyses

Variables	Univariate			Multivariate		
	OR	CI	P value	OR	CI	P value
Age	1.0	0.9─1.0	0.067	1.0	0.9─1.0	0.805
Primiparae	2.9	1.5─5.8	0.002	0.4	0.1─3.5	0.477
Housewives occupation	0.8	0.3─1.8	0.671	1.4	0.6─3.2	0.367
History of jaundice	0.1	0.02─1.5	0.111	0.1	0.1─2.1	0.145
History of Blood transfusion	0.4	0.05─3.4	0.416	2.4	0.1─44.7	0.552
Previous surgery	1.1	0.4─2.73	0.829	0.8	0.2─3.1	0.857
Education < secondary level	6.5	0.8─48.8	0.071	4.9	0.5─44.2	0.150
History of vaginal delivery	4.6	1.8─11.5	0.001	1.4	0.3-6.2	0.656
History of home delivery	8.2	3.2─21.3	0 < 0.001	4.5	1.2-16.7	0.022

The current study found that delivery at home is a risk factor for testing positive both on univariate and multivariate analysis a finding that contradicts our previous reports [9, 15, 19]. Although the study population is not representative of the whole of Sudan due to the fact that the sample was withdrawn from a single hospital, the data illustrate clearly a low seroprevalence of HIV among pregnant mothers. Nevertheless, there is a need to decrease perinatal transmission and therefore, it may be recommended that even though the curative treatment for HIV is not readily available at present, we can reduce, if not prevent, pediatric HIV infection by early screening of pregnant mothers for HIV followed by perinatal short-term anti-retroviral therapy, safe delivery practices, and modified infant feeding.

CONCLUSION:

Prevalence of HBV and HCV among pregnant women in this setting is in the intermediate zone of endemicity. This is alarming and should draw medical authorities' attention if vertical transmission is to be reduced.

Competing interests:

The authors declare that they have no competing interests.

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