

## Short Communication

# Prevalence of anti-hepatitis C virus antibodies in pregnant women and their offspring in a tertiary hospital in Southwestern Nigeria

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### Abstract

**Background:** The aim of this prospective study was to determine the prevalence of HCV antibodies among pregnant women and their corresponding offspring in a tertiary medical centre in Southwestern Nigeria.

**Method:** Anti-HCV antibodies (anti-HCV antibodies) were analyzed in blood samples from mothers and cord samples from their corresponding offspring using the Enzyme Linked Immunosorbent Assay (ELISA) method. The results obtained from the study were expressed in simple percentages.

**Results:** Out of the 272 consenting pregnant women screened for anti-HCV antibodies, 25 (9.2%) of them were positive. As none of the pregnant women had multiple births, screening the 272 cord sera from their offspring for the same antibodies revealed that 3 (1.10%) of them were also positive. Thus, the prevalence of anti-HCV antibodies in the pregnant women and their offspring were 9.2% and 1.1% respectively.

**Conclusion:** If vertical transmission of HCV were to be based on the acquisition of anti-HCV antibodies alone, the prevalence of vertical transmission from HCV infected mothers to offspring in the study was 12.0%. Further studies on vertical transmission are suggested to include analysis for HCV-RNA quantification in pregnant mothers and their offspring as well as a long-term follow-up of neonates seropositive for HCV markers. Such studies are necessary to justify any recommendations to be made for the purpose of reducing HCV infection through vertical transmission.

**Key Words:** Prevalence, Hepatitis C Virus (HCV), anti-HCV antibodies, HCV-RNA Vertical Transmission.

*J Infect Developing Countries* 2007; 1(3):333-336.

Received 2 August 2007 - Accepted 19 November 2007.

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### Introduction

Hepatitis C virus (HCV) infects the liver and multiplies in the organ for many years; while some infected individuals live with the virus without major health problems as chronic carriers, a sizable proportion of the rest succumb to cirrhosis and cancer of the liver [1].

The global prevalence of HCV infection is estimated to be approximately 3% (170 million) of the world's population; the virus accounts for about 20% and 70% of cases of acute and chronic hepatitis respectively [2,3]. Africa is reported to have the highest prevalence rate for HCV [4] as there exists worldwide considerable geographical variation in its prevalence, ranging from as low as 0.01–0.1% in the United Kingdom and Scandinavia to as high as 17–26% in Egypt [5].

There are various routes of transmission of HCV but direct percutaneous inoculation is the

most efficient [6]. The Anti-HCV screening of blood and blood products introduced during the early 1990s has minimized transfusion of blood and blood products as a major mode of HCV acquisition [7]. Several studies have demonstrated that sexual, household, occupational, and vertical transmissions from mother to offspring are of some significance in the transmission of HCV [6].

Most studies conducted in the developed world have shown low prevalence rates on the vertical transmission of HCV [8,9,10]. In Africa, such studies had been conducted mainly in Egypt and Morocco [11,12,13,14] with rates of transmission from HCV-RNA positive mothers ranging from 0% to 36%. In sub-Saharan Africa, however, a study conducted in Tanzania among 980 pregnant women with a seroprevalence of 5% for HCV showed only one child to be HCV-RNA positive at 18 months of age [15].

Theoretically, vertical transmission of HCV from mother to offspring may occur at conception, in utero and during the perinatal period; however, its mechanisms, including timing, remain largely unknown [16]. Vertical transmission also remains the only route of acquisition of the virus by children in most developed countries [17]. While some studies have shown that vertical transmission rate for HCV was significantly higher for vaginally delivered infants compared with infants delivered by cesarean section [18], a review by the Centre for Disease Control in the USA [19] indicated no significant differences between these two modes of delivery. Although HCV-RNA has been found in breast milk samples, there is no evidence that suggests breastfeeding is a vehicle of HCV transmission from mother to offspring [17,20].

It is pertinent to note that the most significant factor in vertical transmission from mother to offspring is a high maternal HCV viral load at the time of delivery [19,21]. A high level of maternal Alanine Aminotransferase (ALT) is also in support of vertical transmission [11].

In the newborn period and beyond, evidence of contact with the HCV includes demonstration of HCV viral antigen by Polymerase Chain Reaction (PCR) and the presence of Anti-HCV antibodies especially beyond the age of 18 months [22].

Because there has been no data from long-term longitudinal studies of children infected with the HCV following vertical transmission, the ultimate outcome of this mode of transmission remains largely unknown [23]. Despite this, studies in some children with HCV have demonstrated histological features of chronic hepatitis, varying degrees of HCV viraemia and persistently abnormal levels of ALT [22,24,25,26]. In one study in Egypt, deaths from hepatocellular disease have been recorded in children who acquired HCV by vertical transmission [2].

The necessity to determine the degree of contribution of vertical transmission of HCV to childhood morbidity in the population is considered as being the justification for this study.

The aims and objectives of this study, therefore, were two-fold: to evaluate the prevalence of anti-HCV antibodies in pregnant women and their offspring (immediately after birth) at the Ladoke Akintola University Teaching Hospital, Osogbo, Osun State of Nigeria; and to suggest some means of reducing the prevalence

of HCV infection in the population studied though limiting vertical transmission of the virus from mothers to their offspring.

## Materials and Methods

The study was conducted between 1 March 2005 and 31 October 2006 at the Ladoke Akintola University of Technology Teaching Hospital, (LTH), Osogbo, Osun State, a relatively new referral medical center in Southwestern Nigeria.

The monthly antenatal clinic attendance of this institution is an average of 52, while an average of 35 neonates are delivered monthly in the maternity unit of the hospital.

The purpose and procedures of the study were explained to pregnant women who came to register for antenatal care in the hospital within the study period. The 272 pregnant women who gave informed consent for themselves as well as for their subsequent offspring were enrolled as the subjects for the study. A simple demographic questionnaire was administered on each woman who consented.

At the time of delivery, a venous blood sample was collected from each mother and a cord blood sample was also taken from her corresponding offspring. Each blood sample was allowed to clot and retract; the serum that was subsequently obtained was stored at -20°C until analyzed.

Each sample of maternal and neonatal cord sera was analyzed for anti-HCV antibodies using the Enzyme Linked Immunosorbent Assay (ELISA) method from Dialab Company, a subsidiary of Human Laboratory, Germany, at the Chemical Pathology Laboratory of the hospital. Samples that were found positive for anti-HCV antibodies were subsequently compared with positive and negative controls.

Since there were no multiple births recorded in any of the pregnant women, 272 pairs of maternal and neonatal samples were thus analyzed. The result from each maternal sample was paired with the result obtained from the cord sample of her corresponding offspring.

## Results

Table 1 shows that 25 (9.2%) of the 272 sera from the pregnant women were positive for anti-HCV antibodies while 3 (1.1%) of the 272 neonatal cord samples were positive for the same antibodies. Thus, the prevalence of anti-HCV

among the pregnant mothers studied and their offspring were 9.2% and 1.1% respectively.

**Table 1.** Sera from Pregnant women and neonates screened for anti-HCV antibodies.

Serum Analyzed	Total	Positive Reaction to anti-HCV antibodies
From pregnant women in the study	272	25 (9.2%)
From cord blood of the offspring of the pregnant women in the study	272	3 (1.1%)

When the results from maternal samples and cord samples were paired, it was observed that the 3 positive cord samples were from among the offspring of the 25 pregnant mothers who were also positive for anti-HCV antibodies. Thus the prevalence of acquisition of anti-HCV antibodies or vertical transmission of HCV from mothers by the neonates in this study was 12.0%.

Table 2 shows the responses of the pregnant women to the administered questionnaire. The data showed that 90.80% of the women had scarification in form of tribal marks on the face or a tattoo in other parts of the body. None of the women had a past history of blood or blood product transfusion; none had previous instrumental delivery. There was no intravenous drug user amongst them.

**Table 2.** Responses to questionnaire administered on 272 consenting pregnant women in the study.

Questions asked from each of the 272 pregnant women	Responses	
	Yes N(%)	No N(%)
Any tattoos, scarification or tribal marks?	247(90.8)	25(9.2)
Any past history of induced abortion or Caesarean section?	0(0.0)	272(100.0)
Any past history of blood or blood product transfusion?	0(0.0)	272(100.0)
Any history of intravenous drug usage?	0(0.0)	272(100.0)

**Discussion**

A prevalence rate of 9.2% for anti-HCV antibody among pregnant women in this study is higher than that of 1% - 2.6% earlier reported in similar studies on pregnant women from the Guinea and Côte d'Ivoire, [23,24] two countries in the same West African sub-region with Nigeria. This prevalence is, however, within the range of 3.9% to 13% reported in pregnant women from the non-West African countries of Tanzania, Egypt,

Congo, Malawi, and Cameroon [25,26,2829], These variations, noticed in different parts of sub-Saharan Africa, may be related to the peculiarities in the modes of transmission of HCV dictated by socio-cultural practices and environmental factors, as 90.8% of women in this study had scarification marks while none of them practiced intravenous drug usage. These disparities may also be attributed to different epidemiologic methods of study; it should be pointed out that the choice of the serological algorithm to determine HCV seroprevalence is of great importance in developing countries where inter-current infections contribute to false-positive Enzyme Immunoassay (EIA) results [28].

The prevalence of anti-HCV antibodies immediately after birth in neonates in this study was 1.1%. If the presence of anti-HCV antibodies in the cord serum of these neonates were to be the basis for the determination of vertical transmission in the study, this would be 12%. Since some of the anti-HCV antibodies may have been passively acquired from mothers seropositive for the antibodies, [29] demonstrations of viral antigenaemia in these neonates soon after birth and serially in early childhood are thus required to determine the true prevalence of vertical transmission in the population studied. The reason for this is that complete disappearance of anti-HCV antibodies have been demonstrated in some children who were initially seropositive for the antibodies as neonates [28].

This study has demonstrated that vertical transmission can be considered as a route key of HCV acquisition in the population studied. It is therefore suggested that wider studies should be conducted, particularly with regard to the determination of HCV RNA in both pregnant women and their offspring to ascertain the true prevalence of vertical transmission of HCV in this population. A long-term longitudinal follow-up of children who are HCV RNA positive in early life, especially following vertical transmission, is also required. In the meantime, measures such as proper screening of blood and blood products for HCV, environmental sanitation, and the discouragement of unnecessary and unsupervised parenteral injections and skin beautification with scarification marks should be promoted as means of reducing acquiring HCV infection in the population.

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**Conflict of interests:** The authors declare that they have no conflict of interests.