Journal of Health, Medicine and Nursing
ISSN 2422-8419 An International Peer-reviewed Journal
Vol.37, 2017

High Prevalence of Anti-HCV Antibodies Among Pregnant Women in Southwestern Nigeria

Margaret Oluwatoyin Japhet[1*], Emmanuel Donbraye[2],
Olufisayo Adeyemi Adesina[1], Moses Olubusuyi Adewumi[3]

1. Department of Microbiology, Faculty of Science, Obafemi Awolowo University, Ile-Ife, Nigeria
2. Department of Medical Microbiology and Parasitology, College of Health Sciences, Obafemi Awolowo University, Ile-Ife, Nigeria
3. Department of Virology, College of Medicine, University of Ibadan, Ibadan, Oyo State, Nigeria.

* E-mail of the corresponding author: megdeoti@yahoo.com

Abstract

Hepatitis C virus (HCV**)** is the most common cause of cirrhosis, hepatocellular carcinoma and liver transplantation. While universal screening for other blood-borne viruses (BBVs) such as HIV and HBV among pregnant women is recommended in Nigeria, no such recommendation exist for HCV in the country. Despite recently developed direct-acting antiviral agents (DAAs) to cure HCV at high rates and at very high cost, the absence of an HCV vaccine or approved therapy during pregnancy makes prevention of vertical transmission impossible at the moment. Using a commercially available enzyme linked immunoassay technique, prevalence of antibodies to hepatitis C virus (anti-HCV) was determined among pregnant women attending antenatal clinics in Southwestern Nigeria. Of the 273 serum samples obtained from the pregnant women 9.5% was positive for anti-HCV antibody. There were differences in anti-HCV prevalence by age and locality. Results of the study confirm endemicity of HCV among pregnant women in the country, consequently, we advocate free screening, among other essential measures for HCV intervention in Nigeria.

Keywords: HCV, Hepatitis, Pregnant women, Seroprevalence, ELISA, Nigeria

1. Introduction

Viral hepatitis is an inflammation of the liver due to viral infections. While there are other agents of viral hepatitis, Hepatitis B and C viruses are the most common types, and are the causative agents of severe forms of liver disease with high rates of mortality (El-Selag, 2012), surpassing HIV and AIDS to become the seventh leading cause of death worldwide (Buckley, et al., 2016). With about 185 million people infected globally, (Mohd et al., 2013), hepatitis C virus (HCV) infection has been recognized as a global health problem as well as the most common cause of cirrhosis, hepatocellular carcinoma and liver transplantation (Muñoz-Gámez et al, 2016). Globally, 3-4 million people are newly infected with HCV, and 350,000 patients die every year due to HCV-related disorders (Negro, 2014; Webster et al., 2015). The prevalence of HCV varies greatly by country worldwide. The lowest rates are observed in northern European countries, with progressively higher rates of infection noted in southern Europe, Asia and Africa (Sievert et al., 2011; Hahné et al., 2013).

HCV is parenterally transmitted and risk factors include blood transfusion, previous surgical and dental procedures, sharing of sharps (including tattooing/scarification and intravenous drug use) and, to a lesser extent, sexual contact and perinatal transmission during delivery (Onyekwere et al., 2016). Recently, HCV in pregnancy has been shown to pose substantial risk for vertical HCV transmission (Pawlowska, et al., 2015; Elrazek et al., 2016; Muñoz-Gámez et al., 2016; Tovo et al., 2016); a risk estimated at approximately 5% (3%-10%) globally (Le Campion et al., 2012; El-Shabrawi and Kamal, 2013; Tovo et al., 2016). Incidence of HCV infection in pregnant women ranges from 1%-2% in the United States and Northern Europe and up to 8% in developing countries (Sood et al., 2012).

HCV infection as it specifically relates to pregnancy has been a neglected condition (Arshad et al., 2011; Prasad and Honegger, 2013). Despite the increasing rate of mother to child transmission (MTCT) of HCV, most HCV-infected pregnant women are not promptly identified in many parts of the world (Blasig et al., 2011; Pinto et al., 2011; Orkin et al., 2016), including Nigeria where routine diagnosis of HCV in pregnant women is not done. Prompt identification of hepatitis C viraemic mothers in pregnancy is relevant because it forestalls potential effects of infection on pregnancy, risk of transmission to their infants, and the risk of long-term complications

consequent of HCV infection. It also has the potential for appropriate management of the current pregnancy, reducing vertical transmission by informing the obstetric team to avoid use of obstetric interventions that could pose risk of transmission as well as to provide treatment for the newborn since clinical trials using Direct Acting Antivirals (DAAs) for children with hepatitis C are currently underway (Ohmer and Honegger, 2016; Schwarz and Karnsakul, 2017). This study was therefore aimed at assessing the prevalence of HCV antibodies in previously unscreened pregnant women in Southwestern Nigeria.

2. Materials and Methods

2.1 Study Location and Participants

A hospital-based cross-sectional study was conducted from May to September 2008 to determine seroprevalence of anti-HCV antibodies among pregnant women attending antenatal clinics at (1) Ondo State Specialist Hospital, Akure, Ondo state, (2) State Teaching Hospital, Ado Ekiti, Ekiti state, and (3) Obafemi Awolowo University Teaching Hospital Complex (OAUTHC) Ile-Ife, Osun state. The three hospitals where the study was carried out are located in Southwestern region of Nigeria, and the participants were selected by simple random sampling method.

2.2 Sample Collection and Preparation

Two hundred and seventy-three pregnant women attending antenatal clinic were enrolled for the study. Five millilitres of blood was collected from each participant into a previously labelled sterile blood collection tubes free of preservatives and anticoagulants and left for 30 minutes to facilitate clotting. Each blood specimen was separated by low speed centrifugation at 500g for 5 minutes and the serum transferred into appropriately labelled cryovials. The cryovials were kept frozen at -20^0C until analyzed.

2.3 Methodology

Each serum sample was screened for hepatitis C antibody using ELISA based test kit (SP-NANBASE c-96 3.0, General Biologicals Corporation, Taiwan) in accordance with manufacturers' instructions. Sample absorbance value was determined using 450 nm filter wavelength with 620 nm reference wavelength while the sociodemographic data was entered in an excel sheet, cleaned and verified. Subsequently, the data was analyzed using Microsoft Excel 2013, and prevalence of anti-HCV was determined from the proportion of the positive individuals in the study population and expressed as a percentage.

3. Results

3.1 Overall HCV prevalence

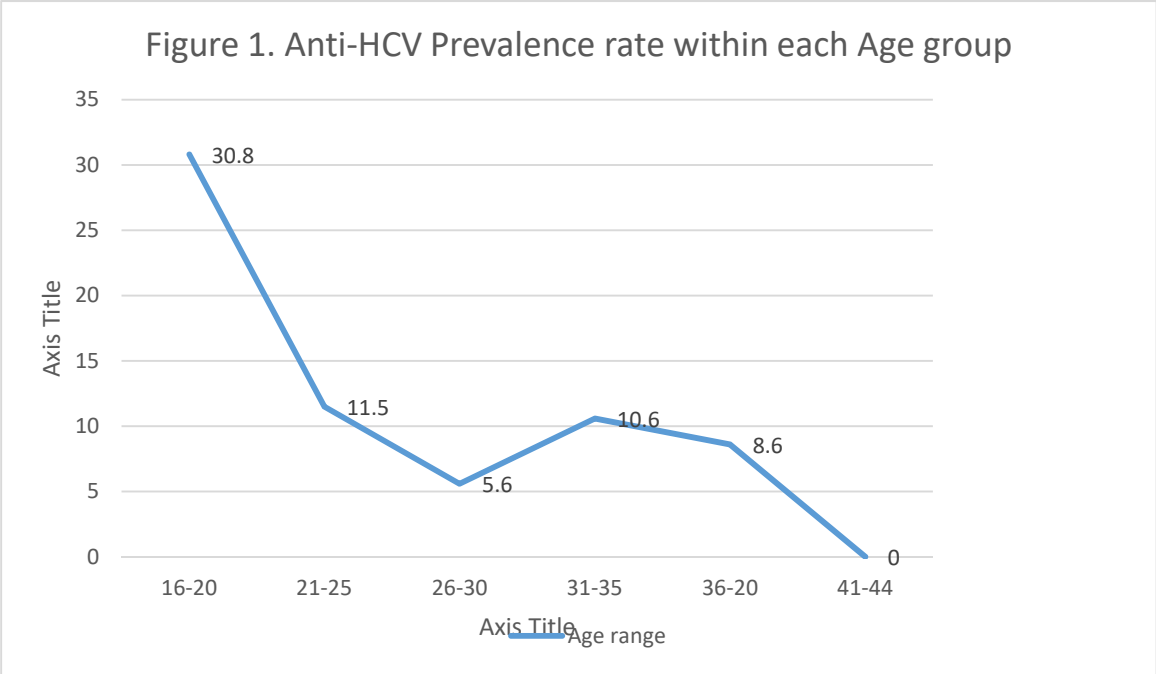
A total of 273 pregnant women (Age range: 16-44 years) were included in this study. The mean age of the study subjects was 29.31 years (SD ± 5.54), and majority of the women are within 26 to 30 years age category. This age category constituted 33% of the total pregnant women, while the lowest (2.9 %) proportion of pregnant women were within 45 and 49 years. Overall, 26 (9.5 %) of the women had serological evidence of infection with HCV.

3.2 Prevalence of HCV by age and location

Highest anti-HCV prevalence rate (26.9%) was recorded among pregnant women in age groups 21-25 and 31-35 years (Table 1). Majority (84.6%; 23/26) of HCV seropositivity were recorded among age below 40 years. HCV prevalence in women older than 40 years was zero as none of them showed detectable anti-HCV antibodies (Table 1). Age group 16-20 years had an anti-HCV prevalence of 15.4 % within its group (Figure 1). HCV prevalence rates of 20.4%, 5.3% and 2.3% were recorded for Ondo, Ekiti and Osun states, respectively.

Table 1: Age distribution of pregnant women and anti-HCV antibody prevalence

Characteristics	Frequency (%)
(a) ***Age distribution of the study population***	
16-20	13 (4.8)
21-25	61 (22.3)
26-30	90 (33.0)
31-35	66 (24.2)
36-40	35 (12.8)
41-45	8 (2.9)
(b) ***Prevalence of anti-HCV by age in the study population***	
16-20	4 (15.4)
21-25	7 (26.9)
26-30	5 (19.2)
31-35	7 (26.9)
36-40	3 (11.5)
41-45	0 (0.0)



4. Discussion

Relevance of HCV in pregnancy cannot be overemphasized, considering the potential effects of infection on pregnancy, the risk of transmission to the unborn child, and the risk of the long-term complications consequent of infection (Prasad et al., 2013). Prevalence of HCV infection among pregnant women in Southwestern Nigeria in the present study was 9.5 % (26/273); thus, showing a high HCV endemicity. Several key findings resulted from this study compared to previous HCV studies in Nigeria.

First and foremost, our study shows that HCV prevalence in Nigeria differs by locality. From the 3 different states included in the study, HCV prevalence among pregnant women in Ondo, Ekiti and Osun state differs

(20.4 %, 5.3 % and 2.3% respectively) with the highest HCV prevalence observed in Ondo state. Previous studies assessing HCV prevalence among pregnant women and in the general population in Ekiti state was 1.39% (Esan et al., 2013) and 1.71% (Akinbolaji et al., 2015) respectively, while among pregnant women in Osun state, HCV prevalence was reported as 9.2% (Ogunro et al., 2007). There were no published data on the prevalence of HCV among pregnant women in Ondo state, hence comparison cannot be made with previous studies from this location.

To corroborate our observation, the HCV prevalence of 9.2% (Ogunro et al., 2007) observed from Osun state in the southwestern part of Nigeria among antenatal clinic attendees is in the same range with that from the three Southwestern states (Ondo, Ekiti, Osun) in this study, irrespective of the differences in time periods. This similarity gives more credence to the findings and suggests no major change in HCV prevalence within the same location between the periods of study. However, larger population surveys, repeated over time are needed to monitor these trends.

Comparison of HCV prevalence among pregnant women in the Southwestern part of Nigeria (as observed in this study) with a previous study in the South-South of Nigeria shows a difference in HCV prevalence -1.86% in the later (Onakewhor and Okonofua, 2009). Similarly, a recent Libyan study also reported variations in HCV prevalence across districts within the country (Daw et al., 2014). These differences might be partly explained by socio-demographics, cultural and risk behaviours that are specific to one area (e.g, scarification or specific medical practices), hence, larger studies covering the six geopolitical zones of Nigeria may be needed to confirm this observation. Likewise, in Italy, France and Spain, the prevalence of HCV varies greatly from one region to another within the same country (Muhlberger et al., 2009; Daw et al., 2014)

Further analysis of the prevalence of HCV in this study population showed a variation from one age group to another. The highest HCV seroprevalence in our study was found among the age group 21-25 and 31-35 with same prevalence rate (26.9 %; 7/26 each) while the lowest was found in age group 41-45 (0%). Age group 16-20 years had the highest prevalence (30.8 %) within group. This is similar to a study conducted among pregnant women in Nigeria which showed a higher HCV prevalence among women aged less than 20 years old within group (Chukwujekwu et al., 2014). Specifically, ages 16 to 35 years accounted for 88.5 % of the total number of study participants positive for anti-HCV in this study. This report agrees with reports from a National population based survey in Libya that showed that anti-HCV was more prevalent in those aged 20 to 40 years (Daw and Bouzedi, 2014).

5. Conclusion

To conclude, a high prevalence of HCV infection exist among pregnant women in Nigeria. HCV infection in pregnancy has been a neglected condition in Nigeria and over the years, the major consequences of chronic HCV infection are likely to accumulate. For now, there is no HCV vaccine, and no approved treatment for HCV in pregnancy, although there is hope of reducing vertical transmission by informing the obstetric team to avoid use of obstetric interventions that could pose risk of transmission as well as to provide treatment for the new-borns using DAAs for children with hepatitis C. Therefore, the primary focus is still on prevention. Thus, scaling up of the screening of pregnant women for HCV infections and provision of health education about the risk factors, the mode of transmissions and prevention is therefore recommended.

LIMITATIONS OF THE STUDY

There are several limitations of this study. Because of insufficient funds (research works are self-funded in Nigeria), no molecular tests were done either to detect HCV RNA or carry out genotyping from blood samples. HCV infection status was detected by serological assay for anti HCV antibody by ELISA method.

CONFLICT 0F INTEREST

The authors declare that no conflict of interests exist.

References

Akinbolaji, T. J., Adekoya-Benson, T., Akinseye, F. J. *et al.,* (2015). Prevalence of hepatitis B virus and hepatitis C virus co-infections among Ekiti people in south-western Nigeria. Int J Health Sci Res. 5(3):121-126.

Arshad, M., El-Kamary, S. S., Jhaveri, R. (2011). Hepatitis C virus infection during pregnancy and the newborn period--are they opportunities for treatment? *J Viral Hepat.* **18**: 229-236.
Blasig, A., Wagner, E. C., Pi, D., et al.(2011) Hepatitis C infection among pregnant women in British Columbia: reported prevalence and critical appraisal of current prenatal screening methods. Canadian journal of public health Revue canadienne de sante publique. 102:98–102.
Buckley, G. J., Strom, B. L. (2016). Eliminating the Public Health Problem of Hepatitis B and C in the United States: Phase One Report. Washington (DC): National Academies Press (US); 2016.
Elrazek, A. E., Amer, M., Hawary, B., Salah, A., Bhagavathula, A. S., Al Boraie, M., Saab, S. (2016). Prediction of HCV vertical transmission: What are factors should be optimized using data mining computational analysis. *Liver Int.* 2016 Apr 28. doi: 10.1111/liv.13146. [Epub ahead of print]
El-Serag, H. B. (2012). Epidemiology of viral hepatitis and hepatocellular carcinoma. Gastroenterology.142:1264–1273.
El-Shabrawi, M. H., Kamal, N. M. (2013) Burden of pediatric hepatitis C. World J Gastroenterol. 19:7880–7888.
Esan, A. J., Omisakin, C.T., Ojo-Bola, T., Owoseni, M. F., Fasakin, K. A and Ogunleye, A. A. (2014). "Sero-Prevalence of Hepatitis B and Hepatitis C Virue Co-Infection among Pregnant Women in Nigeria." *American Journal of Biomedical Research*, vol. 2, (1). 11-15.
Hahné, S, J., Veldhuijzen, I. K., Wiessing, L., et al. (2013). Infection with hepatitis B and C virus in Europe: a systematic review of prevalence and cost-effectiveness of screening. BMC Infect Dis. 13:181.
Le Campion, A., Larouche, A., Fauteux-Daniel, S., Soudeyns, H. (2012). Pathogenesis of Hepatitis C during Pregnancy and Childhood. *Viruses* 4 (12), 3531-3550.
Mohd Hanafiah, K., Groeger, J., Flaxman, A. D., Wiersma, S. T. (2013). Global epidemiology of hepatitis C virus infection: new estimates of age-specific antibody to HCV seroprevalence. Hepatology. 57(4):1333–42.
Muhlberger, N., Schwarzer, R., Lettmeier, B., Sroczynski, G., Zeuzem, S., et al. (2009) HCV-related burden of disease in Europe: a systematic assessment of incidence, prevalence, morbidity, and mortality. BMC Public Health 9: 34.
Muñoz-Gámez, J. A., Salmerón, J., Ruiz-Extremera, Á. (2016). Hepatitis C during pregnancy, vertical transmission and new treatment possibilities. Med Clin (Barc). 2016 May 18. pii: S0025-7753(16)30075-6. doi: 10.1016/j.medcli.2016.04.003. [Epub ahead of print].
Negro, F. (2014). Epidemiology of hepatitis C in Europe. *Dig Liver Dis* **46** Suppl 5: S158-S164 [PMID: 25453870 DOI: 10.1016/j.dld.2014.09.023]
Ohmer, S., Honegger, J. (2016). New prospects for the treatment and prevention of hepatitis C in children. *Curr Opin Pediatr.* 28:93–100.
Onyekwere, C. A., Ogbera, A. O., Dada, A. O., Adeleye, O. O., Dosunmu, A. O., Akinbami A. A., Osikomaiya, B., and Hameed, O. (2016). Hepatitis C Virus (HCV) Prevalence in Special Populations and Associated Risk Factors: A Report From a Tertiary Hospital. Hepat Mon. 2016 May; 16(5):e35532.
Orkin, C., Jeffery-Smith, A., Foster, G. R., Tong C.Y.W. (2016). Retrospective hepatitis C seroprevalence screening in the antenatal setting—should we be screening antenatal women?. BMJ Open. 6: e010661.
Pinto, C. S., Martins, R. M., Andrade, S. M., Stief, A. C., Oliveira, R. D., Castro, A. R. (2011) Hepatitis C virus infection among pregnant women in Central-Western Brazil, 2005–2007. Revista de saude publica. 45:974–6.
Prasad, M. R., Honegger, J. R. (2013). Hepatitis C virus in pregnancy. Am J Perinatol. 30:149-159.
Schwarz, K.B. & Karnsakul, W. (2017) Curr Hepatology Rep. 16: 18. doi:10.1007/s11901-017-0334-1.
Sievert, W., Altraif, I., Razavi, H. A., et al. (2011) A systematic review of hepatitis C virus epidemiology in Asia, Australia and Egypt. Liver Int. 31. (Suppl 2):61–80.
Sood, A., Midha, V., Bansal, M., Sood, N., Puri, S., Thara, A. (2012). Perinatal transmission of hepatitis C virus in northern India. *Indian J. Gastroenterol.* **31**: 27-29.
Tovo, P. A., Calitri, C., Scolfaro, C., Gabiano, C., Garazzino, S. (2016). Vertically acquired hepatitis C virus infection: Correlates of transmission and disease progression. *World J Gastroenterol*. 22(4): 1382-92. doi: 10.3748/wjg.v22.i4.1382.
Webster, D. P., Klenerman, P., Dusheiko, G. M. **(**2015). Hepatitis C. *Lancet* **385**: 1124-1135 [PMID: 25687730 DOI: 10.1016/S0140-6736(14)62401-6].