International Journal of TROPICAL DISEASE & Health
17(3): 1-6, 2016, Article no.IJTDH.27032
ISSN: 2278–1005, NLM ID: 101632866

SCIENCEDOMAIN *international*
www.sciencedomain.org

Evidence of Hepatitis C Virus Antibodies amongst Pregnant Women in Parts of North Central Nigeria

E. I. Bigwan[1,2*], E. D. Jatau[1], H. I. Inabo[1] and S. A. Ado[1]

[1]Department of Microbiology, Ahmadu Bello University, Zaria, Kaduna State, Nigeria.
[2]Department of Medical Laboratory Science, University of Jos, P.M.B. 2084, Jos, Nigeria.

Authors' contributions

This work was carried out in collaboration between all authors. Author EIB designed the study, performed the statistical analysis, wrote the protocol, and wrote the first draft of the manuscript and managed literature searches. Authors EDJ, HII and SAA managed the analyses of the study and literature searches. All authors read and approved the final manuscript.

Article Information

DOI: 10.9734/IJTDH/2016/27032
Editor(s):
(1) Shankar Srinivasan, Department of Health Informatics, University of Medicine & Dentistry of New Jersey, USA.
Reviewers:
(1) Akriti Nepal, China Pharmaceutical University, Nanjing, China.
(2) Huma Ali, Ziauddin University, Karachi, Pakistan.
Complete Peer review History: http://sciencedomain.org/review-history/15074

Original Research Article

Received 16th May 2016
Accepted 10th June 2016
Published 20th June 2016

ABSTRACT

Background: Hepatitis C virus (HCV) is one of the viral hepatitis of great public health significance globally. The infection if not detected and treated at the early stage can cause liver fibrosis that may lead to liver cirrhosis, hepatocellular carcinoma and the eventual death of the individual.
Aim: To determine the evidence of HCV antibodies amongst pregnant women in parts of North Central Nigeria.
Study Design: Cross-sectional.
Materials and Methods: The study was a hospital based. Eight hundred and one (801) samples were collected from consented pregnant women in the study area and were examined for anti-HCV antibody using a third generation enzyme-linked immunosorbent assay (ELISA) Test kit (Autobio Diagnostics, China) based on the manufacturer's instructions. Structured questionnaires were administered to the participants and results were analyzed using SPSS version, 23.0 statistical software package.
Results: Of the 801 samples examined amongst pregnant women in this study, 3.6% were

**Corresponding author: Email: emabigwan@yahoo.com;*

seropositive for HCV antibodies. Age group 10- 20 years had the highest seroprevalence of 6.3%, followed by the age group 31-40 with the prevalence of 3.8%, while the age group 41-50 years had the least with no detectable HCV antibodies. The result showed no significant difference (p = .53). The sero-prevalence of HCV antibodies in relation to marital status shows that the singles had the highest seroprevalence of 5.3%, followed by the married with 3.6%, while the least were recorded amongst the divorced and widowed who showed no detectable evidence of HCV antibodies in their samples. Statistically, the result showed no significant association (p = .93). Participants with non-formal education had the highest seroprevalence of 4.9%, followed by those with secondary education with a seroprevalence of 5.3% and the least was recorded among those with primary education with a seroprevalence of 2.4%. However, the result showed no significant difference (p = .78).

Conclusion: HCV antibodies is evident amongst 3.6% of the pregnant women that consented for the study and this call for health care providers and policy makers to ensure that HCV is included among the routine investigations carried out for ante-natal women in all health facilities in the area during their ante-natal care, this will help the health personnel in the provision of good health care delivery to the mothers and their babies.

Keywords: Seroprevalence; anti-HCV antibodies; pregnant women; Nigeria.

1. INTRODUCTION

Hepatitis C virus infection is a major cause of chronic liver disease, cirrhosis, and hepatocellular carcinoma, giving rise to a major global public health issue [1]. Hepatitis C virus infection is a serious public health problem worldwide. HCV causes chronic infection in 70–80% of infected people. Chronic HCV infection may progress to chronic hepatitis and cirrhosis, leading in many cases to severe complications including hepatocellular carcinoma (HCC) and death [2].

HCV is a prototype member of the *Hepacivirus* genus (from the Greek hepar, hepatos, liver) and is further classified into at least seven major genotypes that differ by about 30 per cent in their nucleotide sequence. These genotypes (1, 2, 3, 4, 5, 6 & 7) have shown differences with regard to their worldwide distribution, transmission and disease progression [3,4].

HCV is a single-stranded, positive-polarity RNA virus, a member of the family *Flaviviridae*. The HCV genome encodes a single long polyprotein with the following gene order: 5'-C-E1-E2-p7-NS2-NS3-NS4A-NS4B-NS5A-NS5B-3' [5].

HCV is a highly infectious, blood-borne agent that causes liver related ailments, and a significant cause of morbidity and mortality in the human population. Identification of HCV genotype/subtype is important for therapy and patient management. Recent studies revealed that there are the 7 major HCV genotypes and 67 subtypes [6].

Viral hepatitis during pregnancy is associated with high risk of maternal complications. It has a high risk of vertical transmission, and it has been reported as the leading cause of maternal death [7,8]. Vertical transmission of hepatitis C virus from an infected mother to her unborn child occurs in less than 10% of pregnancies and there are no measures that alter this risk [9]. It is not clear when during pregnancy transmission occurs, but it may occur both during gestation and at delivery [10]. A long labour is associated with a greater risk of transmission [1]. Another main risk factor identified for vertical transmission was maternal hepatitis C viremia. For mothers who tested positive for HCV RNA, vertical transmission was significantly higher at 7.1% when compared with 0.0% transmission for those who tested HCV RNA negative antenatally [11].

This study was designed to determine the prevalence of HCV antibodies amongst pregnant women and to evaluate its association with age, marital and educational status.

2. MATERIALS AND METHODS

2.1 Background of the Study Area

The North Central Nigeria is made up of six states and Abuja the capital of Nigeria. This study covered three states which comprised of Plateau State, Nasarawa State and Benue State. The States have a diverse range of indigenous ethnic groups. The hospitals used for sampling were the major tertiary health facilities in the study area which serve as referral centres to the

other primary and secondary health care facilities for patients in the study area.

2.2 Study Design

The design was a hospital based cross-sectional study. Samples were collected randomly from all consented pregnant women from the study area and examined for the presence of antibodies for HCV in relation to some vital bio-data captured in a structured questionnaire that was served to all the participants.

2.3 Study Population

The study population focused on pregnant women attending antenatal clinics at Jos University Teaching Hospital (JUTH), Federal Medical Centre (FMC), Makurdi and Federal Medical Centre (FMC), Keffi.

2.4 Ethical Consideration

Ethical approvals were obtained from the Research Ethics Institutional Review Board of Jos University Teaching Hospital, Plateau State, Federal Medical Centre Makurdi, Benue State and Federal Medical Centre Keffi, Nasarawa State before the commencement of the work. Also, informed consent of each participant was obtained before the collection of sample.

2.5 Sampling Method

A structured questionnaire was administered randomly to each consented participant in order to obtain some demographic data which include: their age, marital and educational status.

2.6 Sample Collection

Five millilitres (5 ml) of blood was collected in an anti-coagulated tube. The plasma was separated and stored in a freezer at -20 until ready for use.

2.7 Inclusion and Exclusion Criteria

All those that consented and were HIV negative within the study population were recruited. All those who declined their consent and those infected with HIV were excluded.

2.8 Assay Procedure

The samples were all examined for antibody to HCV (anti-HCV) using a third generation ELISA Kit manufactured by Autobio Diagnostics, China in accordance with the manufacturer's instructions.

2.9 Statistical Analysis

Data was subjected to statistical analysis using the statistical software SPSS version 23.0. Pearson chi-squares were calculated at a 95% confidence interval. P values < .05 were considered statistically significant.

3. RESULTS

Of the 801 samples examined amongst pregnant women in this study, 3.6% were seropositive for HCV antibodies. Age group 10- 20 years had the highest seroprevalence of 6.3%, followed by the age group 31- 40 with the prevalence of 3.8%, while the age group 41-50 years had the least with no detectable HCV antibodies as shown in Table 1. The result showed no significant association (p = .53).

Table 1. Age-related seroprevalence of HCV antibodies amongst pregnant women in the study area

Age group (Years)	No. examined	No. positive (%)
10- 20	80	5(6.3)
21-30	499	16(3.2)
31-40	212	8(3.8)
41-50	10	0(0.0)
Total	801	29(3.6)

χ^2= 2.220; df= 3; p = .53

The sero-prevalence of HCV antibodies in relation to marital status shows that the singles had the highest seroprevalence of 5.3% followed by the married with 3.6%, while the least were recorded amongst the divorced and widowed who showed no detectable evidence of HCV antibodies (0.0%) in their samples as shown in Table 2. Statistically, the result showed no significant difference (p = .93).

Table 2. Seroprevalence of HCV antibodies among the pregnant women in relation to marital status

Marital status	No. examined	No. positive (%)
Single	19	1(5.3)
Married	774	28(3.6)
Divorced	3	0(0.0)
Widowed	5	0(0.0)
Total	801	29(3.6)

χ^2= 0.447; df= 3; p = .93

Table 3 shows that participants with non-formal education had the highest seroprevalence of 4.9%, followed by those with secondary education 33 (5.3%) and the least was recorded among those with primary education with a seroprevalence of 2.4%. However, the result showed no significant difference (p = .78).

Table 3. Seroprevalence of HCV antibodies among the pregnant women in relation to educational status

Educational status	No. examined	No. positive (%)
Non-formal	61	3(4.9)
Primary	85	2(2.4)
Secondary	343	14(4.1)
Tertiary	312	10(3.2)
Total	801	29(3.6)

χ^2= 1.049; df= 3; p = .78

4. DISCUSSION

Of the 801 pregnant women examined in the study population, 3.6% were sero-positive for HCV antibodies. This is comparable with earlier findings across the country such as Ugbebor et al. [12] reported a seroprevalence of 3.6% in Benin, Southeastern, Nigeria; Sheyin et al. [13] reported a sero-prevalence of 4.5% in Kaduna State, Northwestern Nigeria, while Mboto et al. [14] reported a low seroprevalence of 0.4% in Calabar, Southeastern Nigeria, while Ogunro et al. [15] reported a much higher seroprevalence of 9.2% for HCV antibodies in South-western Nigeria. The similarities or discrepancies in the result obtained in this study and the other findings across the country may be attributed to differences in the health care delivery systems, socio-cultural or religious beliefs and the sample sizes used in the various studies.

This study reveals that the age group 10-20 years had the highest prevalence and it decreases with increase in age. Earlier studies agreed that the highest seropositivity of HCV antibodies occurred within the most productive age group [16,17]. Seropositivity has been found to increase up to the age of 40 years and then declines [18]. It may be due to exposure of these women to risk factors associated with the transmission of HCV infection. In our study, the seroprevalence in younger women was found to be higher up to the age of 40 years, similar to the other studies [19,20]. The result obtained in this study reveals that age did not show any significant association with the seroprevalence (p = .53).

The sero-prevalence of HCV antibodies in relation to marital status shows that the singles had the highest seroprevalence of 5.3%, followed by the married with 3.6%, while the least were recorded amongst the divorced and widowed who showed no detectable evidence of HCV antibodies in their samples as shown in Table 2. Statistically, the result showed no significant difference (p = .93). Afolabi et al. [21] reported that the unmarried had the highest seroprevalence of 2.1% while the married had a seroprevalence of 1.0%. Nwannadi et al. [22] in a similar study among sickle cell anaemia patients reported that the singles had a higher seroprevalence of HCV antibodies (60%; n= 6) than the married patients (40%; n= 4). Contrary to these findings was a study carried out in Egypt by Sangha et al. [23] who reported the highest prevalence among those once married (16.8%), followed by the married (12.8%) and the least observed among the singles (3.0%). The differences recorded in these studies may be due to variation in certain risky activities engaged by the different marital groups such as unprotected sex with multiple partners, use of contaminated sharp instruments for body piercing, unsafe injections, contaminated medical devices, socio-cultural or religious beliefs and the sample sizes used in the different studies.

This study shows that participants with non-formal education had the highest seroprevalence of 4.9% and the least was recorded among those with primary education with a seroprevalence of 2.4%. Although, the result showed no significant difference (p = .78), there is need for more enlightenment campaign and treatment of all those confirmed to be positive for Hepatitis C Virus infection irrespective of their educational status in order to eradicate or minimize further spread of the infection in the area. Afolabi et al. [21] in a study among blood donors at Ibadan, South-western Nigeria reported that those with tertiary educational status had the highest with 2.0%, followed by those with secondary education (1.1%) and the least recorded among the illiterate/ Quranic education with 0.0% each. The higher prevalence recorded among those with tertiary and secondary education may be due to exposure of these groups to certain risk factors or practices that can predispose them to the infection such as transfusion of contaminated blood, religious beliefs, cultural differences and use of contaminated medical devices during

antenatal care or delivery. Kumar et al. [24] reported in a similar study in north India that literacy status had no significant effect on the prevalence of anti-HCV. On the contrary Rajesh and Sadiq [25] in a study among the general Population in Central Region of Yemen showed the highest seroprevalence of HCV antibodies among illiterate subjects (0.59%; n= 14) and lowest among postgraduate subjects (0.00%; n= 0). The difference was found to be statistically significant ($p > .001$).

5. CONCLUSION

The seroprevalence of HCV antibodies in this study was 3.6%. HCV antibodies is evident amongst different age groups, marital and educational status in this study and these calls for health care providers and policy makers to ensure that HCV screening should be included among the routine investigations carried out for antenatal women in all health facilities in the area during their antenatal care, this will help the health personnel in the provision of good health care delivery for the mothers and their babies. Considering the public health significance of this infection, the high cost of the confirmatory tests and drugs for HCV therapy which is out of the reach of most of the participants. The government should collaborate with non-governmental agencies to set up free standard molecular diagnostic laboratories and treatment centres for those found to be positive. These will go a long way in the prevention and control of the infection in the study population.

CONSENT

The consent forms were filled and signed by all who participated in the study. Those that consented were within the age range of 17- 50 years.

ETHICAL APPROVAL

Ethical approvals were obtained from the Research Ethics Institutional Review Board of Jos University Teaching Hospital, Plateau State (JUTH/DCS/ADM/127/XIX/5103), Federal Medical Centre Makurdi, Benue State (FMH/FMC/MED.108/VOL.1/112) and Federal Medical Centre Keffi, Nasarawa State before the commencement of the work.

ACKNOWLEDGEMENT

We would like to appreciate the authority of University of Jos and TETFUND for their financial assistance to this work. Our appreciation also goes to all medical personnel who assisted us during collection of samples in all the hospitals used for this study.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

1. Alter MJ. Epidemiology of hepatitis C virus infection. World J Gastroenterol. 2007; 13:2436–2441.
2. Itskowitz MS. Hepatitis C: Epidemiology, diagnosis and management. Compr Ther. 2007;33:87–93.
3. Gottwein JM, Scheel TK, Jensen TB, Lademann JB, Prentoe JC, Knudsen ML, et al. Development and characterization of hepatitis C virus genotype 1-7 cell culture systems: Role of cd81 and scavenger receptor class b type i and effect of antiviral drugs. Hepatol. 2009;49:364-77.
4. Kuiken C, Simmonds P. Nomenclature and numbering of the hepatitis C virus. Methods Mol Biol. 2009;510:33-53.
5. Lindenbach BD, Rice CM. Unravelling hepatitis C virus replication from genome to function. Nature. 2005;436:933–938.
6. Smith DB, Bukh J, Kuiken C, Muerhoff AS, Rice CM, Stapleton JT, et al. Expanded classification of hepatitis C virus into 7 genotypes and 67 subtypes: Updated criteria and genotype assignment web resource. Hepatol. 2014;59:318–327.
7. Tse KY, Ho LF, Lao Lao T. The impact of maternal HBSAg carrier status on pregnancy outcome: A case control study. J Hepatol. 2005;43:771-5.
8. Elinav E, Ben-Dov IZ, Shapira Y, Daudi N, Adler R, Shouval D, et al. Acute hepatitis A infection associated with high risk of gestational complications and preterm labour. Gastroenterol. 2006;130:1129-34.
9. Lam NC, Gotsch PB, Langan RC. Caring for pregnant women and newborns with hepatitis B or C. Amer Fam Phys. 2010;82(10):1225–9.
10. Pondé RA. Hidden hazards of HCV transmission. Med Microbiol Immun. 2011; 200(1):7–11.
11. Cottrell EB, Chou R, Wasson N, Rahman B, Guise JM. Reducing risk for mother-to-infant transmission of hepatitis C virus: A systematic review for the U.S. preventive

services task force. Ann Intel Med. 2013; 15;158(2):109-13.
12. Ugbebor O, Aigbirior M, Osazuwa F, Enabudoso E, Zabayo O, Ewing GW. The prevalence of hepatitis B and C viral infections among pregnant women. N Am J Med Sci. 2011;3:238-241.
13. Sheyin Z, Jatau ED, Mamman AI, Randawa AJ, Bigwan IE. Detection of hepatitis C virus amongst pregnant women, in Kaduna state, Nigeria. Wudpecker Journal of Medical Sciences. 2012;1(2):012-015.
14. Mboto CI, Andy IE, Eni OI, Jewell AP. Prevalence, socio-demographic characteristics and risk factors for hepatitis C Infection among pregnant women in Calabar municipality, Nigeria. Hepat Mon. 2010;10(2):116-120.
15. Ogunro PS, Adekanle DA, Fadero FF, Ogungbamigbe TO, Oninla SO. Prevalence of anti hepatitis C virus antibodies in pregnant women and their offspring in a tertiary hospital in Southwestern Nigeria. J of Infect Dev Ctries. 2007;1(3):333-336.
16. Marranconi F, Fabris P, Stecca C, Zampieri L, Bettini MC, Di Fabrizio N, et al. Prevalence of anti HCV and risk factors for hepatitis C virus infection in healthy pregnant women. Infection. 1994;22:333-337.
17. Centres for Disease Control and Prevention. Recommendations for prevention and control of hepatitis C virus infection and HCV related chronic disease. Morb Mortal Wkly Rep. 1998;47(RR-19):1-39.
18. Wasley AD, Alter MJ. Epidemiology of hepatitis C. Semin Liver Dis. 2000;20:1-16.
19. Stevens CE, Taylor PE, Pindyck J, Choo QL, Bradley DW, Kuo G. et al. Epidemiology of hepatitis C virus. A preliminary study in volunteer blood donors. JAMA. 1990;263:49-53.
20. Shaikh F, Qaiser S, Naqvi H, Jilani K, Memon RD. Prevalence and risk factors for Hepatitis C Virus during pregnancy. Gomal J Med Sci. 2009;7(2):86-88.
21. Afolabi AY, Abraham A, Oladipo EK, Fagbami AH. Hepatitis C virus in potential blood donors in Ibadan, Nigeria. Global Advanced Research Journal of Microbiology. 2012;1(9):155-159.
22. Nwannadi IA, Alao OO, Bazuaye GN, Omoti CE, Halim NK. Seroprevalence of hepatitis C virus antibody in sickle cell anaemia patients in Benin-City, Nigeria. Gomal J Med Sci. 2012;10(1):15-18.
23. Sangha J, Fatma El-Zanaty A, El-Sayed N. Risk factors for hepatitis C infection in a national adult population: Evidence from the 2008. Egypt DHS; 2009. Available:http://iussp2009.princeton.edu (Accessed 23 October 2013)
24. Kumar A, Sharma KA, Gupta RK, Kar P, Chakravarti A. Prevalence & risk factors for hepatitis C virus among pregnant women. Indian J of Med Res. 2007;126:211-215.
25. Rajesh NG, Sadiq KA. Seroprevalence and risk factors for hepatitis C virus infection among general population in central region of Yemen. Hindawi Publishing Corporation. Hepat Res Treat. 2012;1-4.

Peer-review history:
The peer review history for this paper can be accessed here:
http://sciencedomain.org/review-history/15074