

Seroprevalence of Hepatitis C Virus Infection Among Health Centre Workers in Calabar, Cross River State, Nigeria

Christopher Ogar Ogar¹, Ifeyinwa Mary Ann Okafor^{*1} and Patience Antigha Akpan¹

¹Department of Medical Lab. Science, Haematology Unit, College of Medical Sciences University of Calabar, Calabar, Nigeria

Hepatitis is a medical condition defined by the inflammation of the liver and characterized by the presence of inflammatory cells in the tissue of the organ. Hepatitis may occur with limited or no symptoms, but often leads to jaundice, poor appetite, malaise, liver diseases, including cirrhosis and hepatocellular carcinoma. Hepatitis C virus (HCV) is the cause of hepatitis C infection. This study was done to determine the prevalence of antibodies to HCV among health centre workers in Calabar, Cross River State, Nigeria. 200 subjects were recruited, both male and female within the age of 18-65 years. Hundred were health centre workers and another 100 were non-health workers. Assay was done using HCV serum/plasma rapid immune-chromatographic kits developed by Abon biopharm (Hangzhou) Co.). The prevalence of HCV infection among health centre workers was found to be 4.0% and it was significantly higher than that of the non-health workers (1.0%). Male health centre workers had seroprevalence of 9.5% which is slightly higher than female health centre workers with seroprevalence of 2.5%. Statistical analysis however, showed no significant difference ($p > 0.05$). The result also shows highest prevalence of 11.1% amongst health centre workers of age range 41-45 years while low prevalence was observed among those aged ≤ 40 years and infection completely absent among those aged ≥ 46 years. There was statistical association ($p < 0.05$) between age of the patients and prevalence of HCV antibodies. In conclusion this study has shown that prevalence of HCV infection was predominantly higher in health centre workers than in non-health workers in Calabar, Cross River State, Nigeria.

Key words: Hepatitis C virus, health centre workers, non-health workers.

Introduction

Health Centres provide a wide range of primary care and community services in towns and villages throughout Nigeria. The services that can be accessed from health centres include family practice but some clinics have expanded greatly and can include internal medicine, pediatric, women's care, family planning, pharmacy, optometry and laboratory services¹.

The term hepatitis C virus (HCV) was first adopted in 1989 following the identification of an RNA viral genome in a random-prime cDNA library derived from a human plasma A sample containing the putative non-A,

non-B hepatitis agent². Epidemiological studies established that there were two routes of transmission of non-A, non-B hepatitis. Thus enteric and parenteral or post transfusion forms were recognized. Hepatitis C virus (HCV) is now established as the major parenteral type. Hepatitis C virus (HCV) is a small enveloped RNA virus which has been allocated to a unique genus, designated Hepacivirus, within the family Flaviviridae]. The HCV genome is a single stranded RNA molecule of positive polarity that contains a single open reading frame with the potential to encode a protein with 3000 amino acid in length³. Transmission of HCV predominantly occurs parenterally as a result of blood transfusion and exposure to blood derivatives. Transplanted organs and needle-stick injuries as well as sexual contact have been

Received: February 20, 2016 Revised: April 9, 2016 Accepted: October 25, 2016

*Corresponding Author: Okafor, Ifeyinwa M.

Department of Medical Lab. Science, Haematology Unit, College of Medical Sciences University of Calabar, Calabar, Nigeria

Email address: okaforifemaryann@yahoo.com

Phone Number: +2348080680620

implicated in the transmission of HCV⁴. There is also growing evidence of vertical transmission (mother to baby)^{5,6}.

Hepatitis C virus is a major global health care problem. The World Health Organization estimates that up to 3% of the world's population has been infected with the virus. High infection rates are found in the Middle East and infection rates of 2.5-10% occur in parts of South America and Asia. More so, 170 million chronic carriers of HCV worldwide are at risk of progressively developing liver diseases, including cirrhosis and hepatocellular carcinoma^{7,8}.

A study conducted at Chicago in 2009, revealed that Health center workers or primary health care workers had higher prevalence of HCV infection⁹. Various prevalence rates of anti-HCV antibodies have been documented in African countries, a low prevalence of 2.8% was found in blood donors in a Ghana study while 15.8% prevalence was reported among Egyptian blood donors^{10,11}. In Nigeria, several prevalence rate of HCV infection have been reported in different populations, 5.8% prevalence was found among blood donors in Southern Nigeria¹², while states such as Lagos, Osun and Plateau States have recorded anti-HCV antibody prevalence rates of 8.4%¹³, 9.2%¹⁴ and 5.7%¹⁵ among blood donors, pregnant women and HIV patients respectively. Relatively little work has been done in the area of establishing the prevalence of HCV infection in different subpopulations especially health care workers working at primary health care centers. It is however pertinent that studies on this group of health care workers be done so that the current status and prevalence rate of this viral infection among this subpopulation can be known and also highlighted for the attention of appropriate health authorities. This study therefore, was designed to determine the prevalence of antibodies to HCV among health center workers in Calabar, Cross River State of Nigeria.

MATERIALS AND METHOD

This study was conducted in Calabar. The subjects were health centre workers who were sourced from health centers in the various communities in Calabar, Cross River State Nigeria. One hundred health center workers consisting of both males (21) and females (79) within the age range of 18-65 years were recruited in this study. The control subjects consisted of one hundred age-matched apparently healthy male and female who are non-health workers living within the same locality. The subjects were given structured questionnaires to fill

and this provided useful information for this study. Ethical clearance was obtained from the State Ministry of Health.

Five (5 ml) of venous blood was collected from each participant into sterile bottles and allowed to clot and then centrifuged. The serum was then pipetted into sterile ependorf tubes and stored at -20°C until ready for use. The test and interpretation of the results were done according to the guidelines of the kit's manufacture.

The assay was carried out using HCV serum/plasma rapid immunochromatographic kits developed by Abon biopharm (Hangzhou) Co. limited. The HCV serum/Plasma Device is a rapid, one step test for the qualitative detection of antibodies to Hepatitis C virus in serum or plasma. The HCV serum/plasma device is a qualitative, membrane based immunoassay for the detection of antibody to HCV in serum or plasma.

Statistical analysis was performed using Chi-square for the comparison between frequencies of positivity for hepatitis C Virus markers between the groups.

RESULT

Figure 1 shows the seroprevalence of hepatitis C virus antibodies among health centre workers and non-health workers in Calabar. Four (4%) out of the 100 health centre workers were seropositive while ninety-six (96%) were seronegative for hepatitis C virus antibodies. Also, one (1%) out of the 100 non-health workers was seropositive while ninety-Nine (99%) were seronegative for hepatitis C virus antibodies. Table 1 shows the prevalence of hepatitis C virus antibodies based on gender among health centre workers and non-health workers in Calabar. Out of 21 (21%) male health centre workers screened, 2 (9.5%) were seropositive for the hepatitis C virus infection where as out of the 79 (79%) female health centre workers screened, 2 (2.5%) were seropositive for the hepatitis C virus infection. Also, out of the 53 (53%) male and 47 (47%) female non-health workers screened, 1 (1.9%) and (0%) were seropositive for the hepatitis C virus antibodies respectively.

The seroprevalence of hepatitis C virus antibodies among health centre workers and non-health workers in Calabar based on age is shown in table 2, sixteen (16%) of the health centre workers were aged 20-30 years with 0% seroprevalence of hepatitis C virus. Then fifty (50%) of the health centre workers were aged 31-40 years with 2 (8.0%) seroprevalence of hepatitis C virus. Also, 34 (34%) of the health centre workers were aged 41-50 years with 2 (11.1%) seroprevalence of hepatitis C virus.

More than half of the non-health workers participants 96(96%) were aged 20-35 years with 1 (7.7%) seroprevalence of hepatitis C virus. Those aged ≥ 35 years i.e. 36-50 years were comparatively few 4 (4%) with 0(0%) seroprevalence of hepatitis C virus. Table 3 reveals the seroprevalence rate of hepatitis C virus infection among health centre workers in Calabar based on duration of work (period of exposure). Ninety-two (92) of the health centre workers have worked for a period of 1-108 months, out of which 4(4.6%) were seropositive for hepatitis C virus, while eight (8) of the health centre workers who had worked for 109-252 months were all seronegative for hepatitis C virus.

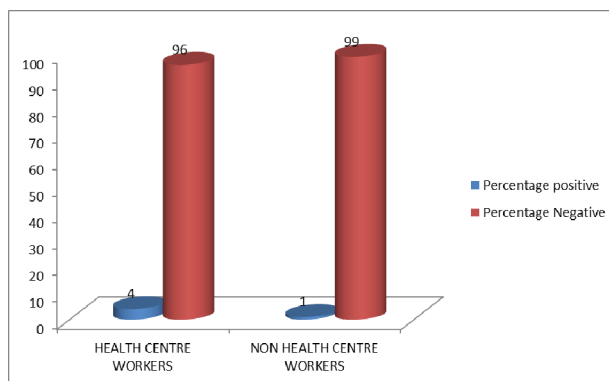


Fig.1 Prevalence of hepatitis C virus infection among health centre workers and non-health workers in Calabar, Cross River State.

Table 1 Prevalence of hepatitis C virus infection based on gender among non-health workers and health centre workers in Calabar.

GENDER	NON-HEALTH CENTRE WORKERS	PREVALENCE OF HCV	HEALTH CENTER WORKERS	PREVALENCE OF HCV
MALE	53 (53%)	1 (1.9%)	21 (21%)	2 (9.5%)
FEMALE	47 (47%)	0 (0%)	79 (79%)	2 (2.5%)
TOTAL	100	1 (1.9%)	100%	4 (12.0%)

P>0.05

Table 2 Prevalence of hepatitis C virus infection among health centre workers and non-health workers in Calabar based on age.

AGE (5 YEARS INTERVAL)	HEALTH CENTER WORKERS	PREVALENCE OF HCV	NON-HEALTH CENTER WORKERS	PREVALENCE OF HCV.
20-25	2 (2%)	0 (0%)	44 (44%)	0 (0%)
26-30	14 (14%)	0 (0%)	39 (39%)	0 (0%)
31-35	24 (24%)	1 (4.2%)	13 (13%)	1 (7.7%)
36-40	26 (26%)	1 (3.8%)	4 (4%)	0 (0%)
41-45	18 (18%)	2 (11.1%)	0 (0%)	0 (0%)
46-50	16 (16%)	0 (0%)	0 (0%)	0 (0%)
TOTAL	100	4 (19.1%)	100	1 (7.7%)

P<0.05

Table 3 Prevalence of hepatitis C virus infection based on duration of work among health centre workers in Calabar.

DURATION OF WORK IN MONTH (36 MONTHS INTERVAL)	NUMBER SCREENED	NUMBER POSITIVE	PREVALENCE
1-36	41	2	4.8%
37-72	37	1	2.7%
73-108	14	1	7.1%
109-144	2	0	0%
145-180	2	0	0%
181-216	1	0	0%
217-252	3	0	0%
TOTAL	100	4	4%

P>0.05

DISCUSSION

Hepatitis C virus (HCV) infection is a serious, major global health care problem worldwide. It is a significant burden on the health services especially in most developing countries with limited resources. Infected people who are chronic carriers of HCV worldwide, therefore either unconsciously contributes to the transmission of the virus or do not seek medical attention with a resultant liver cirrhosis or hepatocellular carcinoma¹⁶

The result of this study reveals that the prevalence of antibody to hepatitis C virus among health centre workers in Calabar Cross River State Nigeria was found to be 4.0%. This is significantly higher than 1.0% seroprevalence rate found among non-health centre workers in this study. This rate (4.0%) is higher than the 3.0 % worldwide seroprevalence reported by the World Health Organization¹⁷ but slightly lower than the 5.3 % reported for the whole Africa region. However, the rate 4.0% obtained in this study is slightly lower than 4.8% obtained by Jossy¹⁸ in Ibadan, Nigeria among health centre workers and 11% obtained by Olubuyide *et al.*¹⁹ among doctors and dentists working at the University College Hospital (UCH), Ibadan-Nigeria. We suggest that differences in educational levels, socio-economic status, access to preventive measures, occupational risks patterns, difference in disease prevalence in general populations, differences in exposure risks over time, as well as awareness of HCV infection and control practices may account for the observed discrepancy in prevalence in comparable settings.

The increased seroprevalence of HCV infection among health centre workers may be due to the fact that these health care workers are frequently exposed through their occupation to blood-borne pathogens through percutaneous injuries and mucocutaneous blood contacts such as cuts, needle sticks, splashes to mucous membranes or other body injuries. It may also be due to increased exposure to infectious agents due to non-adherence to safety rules such as working without gloves, careless handling of used sharp object or equipments. This is in accordance with reports from several studies which shows that HCV is spread by exposure or body contact with infected blood and body fluids²⁰.

Consistent with the observation of Inyama *et al.*²¹ and Umolu *et al.*²² males in this study had higher (9.5%) HCV antibody prevalence than the females (2.5%). This observation is contrary to that of Ejele *et al.*²³ who reported that females had higher HCV antibody prevalence than

males in Niger Delta, Nigeria. Statistical analysis like in our study, however, showed no significant difference ($p>0.05$) between the prevalence rates of the male and female individuals. This supports the fact that gender does not really affect the infection and prevalence rate of HCV infection among any group of individuals, health centre workers inclusive.

Analysis of the age related seroprevalence of HCV in this study shows that the highest prevalence of infection was 11.1% found among those aged 41-45 years while infection was low among those who were ≤ 40 years and completely absent among those who were ≥ 46 years. This peak of infection was similar to that reported in Benin city²² and Port Harcourt²⁴ and also in the United States where highest prevalence was observed among persons 30-49 years old⁴. Another pattern that emerges is observed in Egypt, where the prevalence of HCV infection increases steadily with age and high rates of infection were observed among persons in all age groups²⁵. The findings of this study were not in agreement with observations of Ejele *et al.*²³, Ayolabi *et al.*¹³ and Udeze *et al.*⁶ who reported highest prevalence of HCV antibodies in the age group 30-39 years and also that of Uneke *et al.*²⁶ in Jos who reported highest seroprevalence among those aged 51-60 years.

The reason for these observed differences in the prevalence pattern of HCV infection in different parts of the world is not immediately known, but is suggestive of the probability of transmission routes other than sexual as mode of acquisition of the HCV among the seropositive individuals.

More so, it was also observed in this study that the seroprevalence rate of HCV infection of health centre workers based on the duration of work or period of exposure has no significant effect on the study since those who worked for one month were infected and having similar seroprevalence rate with those who worked for 100 months and more. This is similar to a cohort study conducted in Chicago⁹, and also in Niger State¹⁸ which revealed that Health centre/primary health care workers had higher prevalence of HCV infection.

In conclusion, our findings further confirm the presence of hepatitis C infection in Nigeria²⁷⁻²⁹. It has shown HCV seroprevalence of 4.0% among health centre workers and 1.0% among non health centre workers in Calabar Cross River State. The finding of a high prevalence of HCV antibodies in health centre workers in Calabar brings to the fore the necessity of adopting measures that will help to create awareness and also ensure that health workers are protected while carrying out their duty.

ACKNOWLEDGEMENTS

We heartily appreciate the permission and supports of the State ministry of health Cross River State and also all the health care workers at various health centers in the state for accepting to be part of this study.

Conflict of Interest: The authors declare that they have no competing financial interests

References

1. Community Health Centers Integrate Rapid HIV Screening Into Routine Primary Care, Leading to Significant Increases in Testing Rates". Agency for Healthcare Research and Quality. 2013-05-08. Retrieved 2013-05-10.
2. Choo QL, Kuo AJ, Weiner LR, Overby DW, Bradley and M. Houghton. Isolation of a cDNA clone derived from a blood borne non-A non-B viral hepatitis genome. *Sci.*, 1989, 244: 359-362.
3. Zignego AL, Fognani E, Giannini C, Gragnani L, and Piluso A. Hepatitis C virus infection in the immunocompromised host: a complex Scenaira with variable clinical impart. *Journal of translational medicine*, 2012, 10, 158.
4. Alter MJ. Epidemiology of Hepatitis C Virus Infection. *World Journal of Gastroenterology*, 2007, 13 (17), 2436 – 41.
5. Bartolome J, Castillo I, Quiroga JA. New Perspective in occult hepatitis C virus infection. *World Journal of Gastroenterology*, 2012, 18 (23); 2887 – 94.
6. Udeze AO, Okonko IO, Donbraye E, Sule WF, Fadeyi A and Uche IN. Seroprevalence of Hepatitis C Antibodies Amongst Blood Donors in Ibadan, Southwestern, Nigeria, *World Applied Sciences Journal*, 2009 , 7 (8): 1023-1028
7. World Health Organization, WHO (2011). Hepatitis C fact sheets. No. 204 Revised august 2011.
8. Wilkins T, Malcolm JK., Raina D and Schade RR. Hepatitis C: diagnosis and treatment. *American family physician*, 2010, 81 (11), 1351-7.
9. Kikenny, U. Natural history of liver fibrosis progression in patients with chronic hepatitis C. *Lancet*, 2009, 349, 825 – 832.
10. Nabulsi MM, Araj GE, Farah AE and Khalil AM. Hepatitis C virus in pregnant Lebanese women. *J. Obstetrics and Gynecol.*, 1997. 17: 548.
11. Wansbrough-Jones MH, Frimpong E, Cant B, Harris k, Evans MR and Teo CG. Prevalence and genotype of hepatitis C virus infection in pregnant women and blood donors in Ghana. *Trans Royal Society of Tropical Medicine and Hygiene*, 1998. 92: 496-499.
12. Booth JC. Chronic hepatitis C: the virus, its discovery and natural history of the disease. *J. Viral Hepatitis*, 1998. 5: 213-22.
13. Ayolabi CI, Taiwo MA, Omilabu SA, Abebisi AO and Fatoba OM. Sero-prevalence of Hepatitis C Virus among Blood Donors in Lagos Nigeria. *African J. Biotechnol.*, 2006, 5(20): 1944-1946
14. Ogunro PS, Adekanle DA, Fadero FF, Ogungbamigbe TO and Oninla SO. Prevalence of Anti-Hepatitis C Virus Antibodies in Pregnant Women and their Offspring in a Tertiary Hospital in Southwestern Nigeria. *J. Infection in Developing Countries*, 2007, 1(3): 333-336.
15. Inyama PU, Uneke CJ, Anyanwu GI, Njoku OM, Idoko JH and Idoko JA. Prevalence of Antibodies to Hepatitis C virus among Nigerian Patients with HIV Infection. *Online J. Health and Allied Sci.*, 2005. 2: 2. www.ojhas.org/issue14/2005-2-2.htm. Retrieved 2009 April, 12.
16. World Health Organization. Global Surveillance and control of hepatitis C. *J. Medical Virol.*, 1999, 6: 35-47.
17. World Health Organization. *World Health Report Switzerland Geneva*, 1996, World Health Organization
18. Jossy J. Practical work carried out on hepatitis C virus infection in Ibadan Nigeria. *Journal of infectious serological diseases*, 2007, 8, 361-398.
19. Olubuyide IO, Ola SO, Aliyu B, Dosumu OO, Aritiba JT, Olaleye OD, Odaibo GN, Odemuyiwa SO and Olawuyi F. Hepatitis B and C in doctors and dentists in Nigeria. *Quarterly J. Medicine*, 1997, 90: 417-422.
20. Monica Cheesbrough. *District Laboratory Practice in Tropical Countries*. Copublished by the press syndicate of the university of Cambridge, 2004, 348.
21. Lozano R. Global and regional mortality from 235 causes of death for 20 age groups in 1990 and 2010; a systematic analysis for the global burden of disease study 2010. *Lancet*, 2012, 380 (9859), 2095 – 128.
22. Umolu E and Okoror P. Report of Hepatitis C prevalence among Health centres workers in Benin city Nigeria. *African health sciences*. 2005, 5: 55-58.
23. Ejele OA, Nwauche CA and Erhabor O. Seroprevalence of Hepatitis C Virus in the Niger Delta of Nigeria. *The Nigerian Postgraduate Medical J., Nigeria*. 2006, 13(2): 103-106.
24. Jeremiah ZA and Tony EE. Hepatitis C virus prevalence among health workers in port Harcourt, Nigeria *journal of hepatitis virus infection*, 2009, 9, 276-281.
25. Mohammed MK, Hussein MH and Massoud AA. Study of the risk factors for viral hepatitis C Virus infection among Egyptians applying for work abroad. *J. Egyptian Public Health Association*, 1996, 71: 113-4
26. Uneke CJ and Ogbu PU. Prevalence of hepatitis C virus infection. *Jos, Nigeria Infectious diseases*, 2005, 100, 13-16.
27. Mutimer DJ, Olomu A and Skidmore S. Viral hepatitis in Nigeria-sickle cell disease and commercial blood donors. *Quarterly J. Medicine*, 1994, 87: 407-11.
28. Mwangi JW. Viral markers in a blood donor R.V. Cunha, L.L. Lewis Limenez, P.H. Cabello, population. *East African Medical J.*, 1999, 79: 35-37.
29. Egah DZ, Mandong BM, Iya D, Gomwalk NE, Audu ES, Banwat EB and Onile BA. Hepatitis C Virus Antibodies among Blood Donors in Jos, Nigeria. *Annals of African Medicine*, 2004. 3(1): 35-37