

# Detection Of Hepatitis C Virus (Hcv) Antibody Among Children In Ibadan, Southwestern Nigeria

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## Citation

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## Abstract

This study was carried out to detect hepatitis C virus (HCV) antibody and risk factors of transmission among children in Ibadan, Oyo State, Southwestern Nigeria. In order to estimate the prevalence rate of HCV and to evaluate the influence of children demographics on HCV seropositivity, a well-designed questionnaire was used to obtain data considered risk factors for contracting HCV from consenting children. This study was conducted between August 2011 and October 2011. Thereafter, 217 apparently healthy male and female children were consecutively selected. A total of 217 blood samples were collected from children attending the Oni Memorial Children Hospital, Ibadan. The male:female ratio was 1:1. Majority of the children were females [109(50.2%)] while males were [108(49.8%)]. Blood samples were screened by parallel diagnostic method using Dia Spot® HCV test kit and Global One Step Strip Style HCV test kit (Global Diagnostic® Canada) for HCV antibody. Overall prevalence rate of HCV antibody was 0.9%. It showed that HCV prevalence was higher among children aged less than 10 years, a total of 192 samples were tested, of which four (4) tested positive for HCV, thus, giving the prevalence of 2.0%. The other age groups showed zero seropositivity for HCV. HCV was only found to be higher among male children [3(1.8%)] than their female counterparts [1(0.9%)]. HCV prevalence was higher among children without history of vaccinations [2(4.9%)] than their counterparts with history of vaccinations [2(1.1%)]. There was significant association ( $p < 0.05$ ) between age, sex, history of vaccinations and HCV infection acquisition among these population. This study however confirmed the presence of HCV among children in Oyo State, Nigeria. General surveillance and public health education to stop the spread of the infection among children in Ibadan and indeed the whole society is advocated.

## INTRODUCTION

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 sample containing the putative non-A, non-B hepatitis agent (Choo et al., 1989). 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 (Mc Lean et al., 1997). Transmission of HCV predominantly occurs parenterally as a result of blood transfusion and exposure to blood derivatives, and the disease was first recognized in recipients of blood and blood products such as factor VIII and immunoglobulins (Mc Lean et al., 1997). Transplanted organs and needles stick injuries have also been implicated in transmission. Mc Lean et al (1997) reported transmission in drug misusers and patients in dialysis and surgical units. Sexual contact has also been incriminated in the transmission of HCV (Alter et al., 1982). There is also a growing evidence of vertical transmission (mother to child transmission).

HCV has been shown to have a worldwide distribution, occurring among persons of all ages, genders, races and regions of the world (WHO, 1996). Different prevalence was reported from different regions of the world. Prevalence of 1.7% was reported from America, 1.03% from Europe, 3.9% from the Western Pacific, 4.6% from the Eastern Mediterranean, 2.15% from South Asia and 5.3% from Africa (WHO, 1999). In Northern Europe, the prevalence of HCV infection among healthy blood donors varies between 0.01 and 0.02% (Mutimer et al., 1995; Booth, 1998). A prevalence rate of 6.5% was reported in Equatorial Africa (Delapoitte et al., 1993) and 20% in Egypt (El-Ahmady et al., 1994). Here in Nigeria, available data showed that the prevalence of HCV among local commercial blood donors ranged from 12.3-14.0% (Mutimer et al., 1994; Halim and Ajayi, 2000).

The prevalence of hepatitis C and the commonest mode of transmission among Nigerians are unknown (Odenigbo et al., 2011), but recent studies across the country among blood donors show a prevalence ranging between 0.4% and 10.4%

depending on locality (Imoru et al., 2003; Egah et al., 2004; Mohammed, 2004; Kaote et al., 2005; Erhabor et al., 2006). However, routine screening for hepatitis C in blood donors is only carried out in major public health institutions in Nigeria today; because of unavailability of screening kits and trained workers in smaller health institutions (Odenigbo et al., 2011). This has obvious grave short and long term health implications on the populace; considering that chronic hepatitis C is a progressive disease, which leads to death through liver failure or hepatocellular carcinoma (HCC) and also predisposes to non-Hodgkin's lymphoma (NHL), multiple myeloma (MM), and renal cell carcinoma (RCC) (Duberg et al., 2005; Gordon et al., 2010; Odenigbo et al., 2011). It is not known whether blood group, age or sex constitute risk factors or are correlated with HCV seropositivity among apparently healthy individuals (Odenigbo et al., 2011). Studies have been done which agree with or refute the above (Jeremiah et al., 2008; Odenigbo et al., 2011).

This study therefore, is designed to determine the prevalence of antibodies to HCV among children in Oni Memorial Children Hospital, Ibadan, South western, Nigeria.

## **MATERIALS AND METHODS**

### **STUDY AREA**

The study area is the Oni Memorial Children Hospital, located at the municipal area of Ibadan, which is made up of five local government areas. Ibadan is the capital city of Oyo State located in the forest zone of southwestern Nigeria. Ibadan city lies on the longitude 3°5' East of Greenwich meridian and latitude 7°23' North of the Equator. Besides being the largest indigenous city in Africa south of Sahara, the city is an important trade and educational centre. It also houses one of the largest and foremost teaching hospitals in Africa. However, the city is characterized by low level of environmental sanitation, poor housing, and lack of potable water and improper management of wastes especially in the indigenous core areas characterized by high density and low-income populations.

### **STUDY POPULATION**

Blood samples were collected from two hundred children at Oni Memorial Children Hospital, Ibadan, South-Western, Nigeria.

### **DEMOGRAPHIC INFORMATION**

Demographic and clinical information of the subjects were obtained by chart abstraction and recorded on a prepared

data collection form. The study groups were also stratified by Age and sex. Other relevant information of all participants was obtained using a preformed specially designed for this purpose. Table 1 summarizes the characteristics of Nigerian children used in this study.

**Figure 1**

Table 1: Demographical Characteristics/Parameters of the Children

Parameters	No. Tested
<b>Age Groups (Year)</b>	
Less than 10	192(88.5)
10-17	25(11.5)
<b>Sex</b>	
Males	108(49.8)
Females	109(50.2)
<b>History of vaccination</b>	
Yes	176(81.1)
No	41(18.9)
<b>Total</b>	<b>217(100.0)</b>

## **SAMPLE COLLECTION**

The method of sample collection employed was venepuncture technique (Cheesbrough, 2006). About 3 ml of blood was collected and transferred into a plain bottle. This was centrifuged and the serum was then pipetted into sterile ependorf tubes and stored at -20C until ready for use.

## **ASSAY FOR HCV ANTIBODIES**

DiaSpot® HCV-Ab Test strips (manufactured by DiaSpot Diagnostics, USA), Global® HCV-Ab Kit (manufactured by Global Diagnostics, USA) and IND® HCV-Ab kits (manufactured by IND<sup>R</sup> Diagnostica, USA) were used in a stepwise order for the detection of anti-HCV antibodies in the blood. These methods which are immunochromatographic and qualitative in nature, detect the presence of anti-HCV antibodies in human blood and can be read in-vitro having more than 99.9% sensitivity and 98.6% specificity. The interpretation of test results was performed according to the manufacturer's specifications.

## **DATA ANALYSIS**

The prevalence for HCV infection was calculated by using patients with positive samples as numerator and the total numbers of patients enrolled in this study as denominator. The data generated from this study were presented using descriptive statistics. The data was subjected to statistical analysis using SPSS computer software version 17.0 for Windows to determine any significant relationship between infection rate, age and gender.

## RESULTS

### OVERALL PREVALENCE OF HCV ANTIBODY AMONG CHILDREN

A total of 217 children were tested for HCV antibody. The age range of the children used in this study was 3 days to 17 years. Majority of the children were females [109(50.2%)] while 49.8% (n = 108) were males. The male:female ratio was 1:1 (Table 1, 2 and 3). Table 2 -4 shows the overall prevalence of HCV antibody. Of the total of 217 samples tested for antibody to HCV, only four (4) tested positive giving HCV prevalence of 0.9%.

### DETECTION OF HCV ANTIBODY IN RELATION TO AGE GROUPS OF CHILDREN

Table 2 also shows the prevalence of HCV in relation to age groups. It showed that HCV prevalence was higher among children ages less than 10 years, a total of 192 samples were tested, of which four (4) tested positive for HCV, thus, giving the prevalence of 2.0%. While the other age groups had zero seropositivity. There was significant association ( $P < 0.05$ ) between age groups and HCV infection acquisition.

#### Figure 2

Table 2: Prevalence rates of HCV among children in relation to age of the subjects

Age groups (Year)	HCV Seroreactivity		
	No. Tested (%)	No. Positive (%)	P-value
Less than 10	192(88.5)	4(2.0)	$P < 0.05$
10 – 17	25(11.5)	0(0.0)	
<b>Total</b>	<b>217(100.0)</b>	<b>4(0.9)</b>	

### DETECTION OF HCV ANTIBODY IN RELATION TO SEX CHILDREN

Table 3 shows the prevalence of HCV in relation to sex of children. Prevalence of HCV antibody was higher among male children [3(1.8%)] than their female counterparts [1(0.9%)]. There was significant association ( $P < 0.05$ ) between sex and HCV infection acquisition among these population.

#### Figure 3

Table 3: Prevalence rates of HCV among children in relation to sex of the subjects

Sex	HCV Seroreactivity		
	No. Tested (%)	No. Positive (%)	P-value
<b>Males</b>	108	3(1.8)	$P < 0.05$
<b>Females</b>	109	1(0.9)	
<b>Total</b>	<b>217</b>	<b>4(0.9)</b>	

### DETECTION OF HCV ANTIBODY IN RELATION

## TO HISTORY OF VACCINATIONS

Table 4 shows the prevalence of HCV antibody in relation to history of vaccinations. HCV antibody was higher among children without history of vaccinations [2(4.9%)] than their counterparts with history of vaccinations [2(1.1%)]. There was significant association ( $P < 0.05$ ) between history of vaccination and HCV infection acquisition among these population.

#### Figure 4

Table 4: Prevalence rates of HCV among children in relation to history of vaccinations

History of vaccinations	HCV Seroreactivity		
	No. Tested (%)	No. Positive (%)	P-value
<b>Yes</b>	176(81.1)	2(1.1)	$P < 0.05$
<b>No</b>	41(18.9)	2(4.9)	
<b>Total</b>	<b>217(100.0)</b>	<b>9(4.1)</b>	

## DISCUSSION

In this study, two hundred and seventeen (217) children were recruited and examined for presence of markers of HCV infections. Over the period under study, the prevalence rate of this viral infection among the subjects was 0.9% for HCV antibodies. This is contrary to previous results reported in different parts of Nigeria (Kagu et al., 2005; Alao et al., 2009; Olokoba et al., 2008, 2009). It is lower than the 12.0% reported by Halim and Ajayi (2000) in Benin City, in South-south Nigeria; the 6.0% prevalence reported by Egah et al. (2004) in Plateau State; the 5.7% reported by Inyama et al. (2005) in Plateau States, Nigeria; the 3.0% found by Ezeani et al (2006) in Southeastern, Nigeria; the 1.5% and 1.6% prevalence of HCV reported by Matee (2006) at MNH in Dar es Salaam, Tanzania; the 8.4% anti-HCV antibody prevalence rate reported by Ayolabi et al. (2006) in Lagos; the 9.2% found by Ogunro et al. (2007) in Osun State, Nigeria; the 5.0% reported by Jeremiah et al. (2008) in Port-Harcourt city, in South-south Nigeria; the 3.60% reported by Sule et al. (2009) in Lokoja, Kogi State, Nigeria; the 8.0% reported by Udeze et al. (2009) in Ibadan, Oyo state, Nigeria; the 8.0% reported by Udeze et al. (2011) in Ilorin, Kwara State, Nigeria; and the 2.0% reported by Odenigbo et al. (2011) in Nnewi, Anambra State, South-Eastern Nigeria.

This prevalence of 0.9% reported in this study is comparable to the 1.1% reported by Buseri et al. (2009) for HCV in Osogbo, Osun State, Nigeria; the 1.5% previously reported by Okonko et al. (2012a) in Abeokuta, Ogun State, Nigeria; and the 1.0% reported in previous studies by Okonko et al. (2012b) in Ibadan, Oyo State, Nigeria. It compared favourably to the 0.85% reported by Chandra et al. (2009) in

India. However, the value reported in this present study is higher than the 0.4% documented by Imoru et al. (2003) in Kano State, North central Nigeria; the 0.2% found in the work of Abdalla et al (2005); the 0.5% in the work of Ejele et al (2005); the 0.0% HCV seroprevalence reported by Elfaki et al (2008) in Sudan; and the 0.0% HCV seroprevalence reported by Alli et al. (2011) in Ibadan, Oyo State, Nigeria; the 1.5% previously reported by Okonko et al. (2012a) in Abeokuta, Ogun State, Nigeria; and the 0.5% reported in previous studies by Okonko et al. (2012c) in Ibadan, Oyo State, Nigeria.

The prevalence of HCV infection in this population was also found to be low when compared to reports from some countries in Western Pacific (3.9%), South East Asia (2.15%), America (1.17%) and Europe (1.03%) (WHO, 2007) and comparable to Eastern Mediterranean (4.6%), it is also lower than reports from some countries in Africa (5.3%) (WHO, 2007) and Egypt (20.0%) reported by Frank et al. (2002) and the reports from Enugu where 14.9% was reported (Ebie and Pela, 2006); the 5.2 and 11.09% reported in Jos and Kaduna respectively (Strickland, 2002) and 4.3% in a study among a presumed low risk group in Jos (Egah et al., 2007).

HCV seroprevalence rates from most developed nations are, not surprisingly, very low (Odenigbo et al., 2011). The lowest prevalence rate was reported from England (0.1%) (Petrik et al., 1999) compared to Spain (0.3%) (Muroz-Gomez et al., 1996), Germany (0.65%) (Palitzsch et al., 1999) and New York (1.8%) (Alter et al., 1999). In Africa, HCV sero-prevalence rates contrast sharply between West and North Africa. While very low prevalence rates were found among blood donors in Dakar Senegal (0.8%) (Etard et al., 2001) and Ghana (0.9%) (Ampofo et al., 2002), very high prevalence rates were reported among blood donors in Egypt, 19.2% (Bassily et al., 1995), 22.5% (Saeed et al., 1991). Egypt is reported to have the highest prevalence of HCV (predominantly genotype 4) in the world and this has been attributed to previous public health eradication schemes for Schistosomiasis (Frank et al., 2000).

In addition, it was observed here that the variables – age, sex and history of vaccination also appeared not associated with HCV antibody prevalence among the studied group. However, it has been shown that HCV antibody prevalence is much higher in adults than in children. The implication of high prevalence of asymptomatic HCV infection among these children is that they may become chronic carriers of the virus, thus acting as reservoirs for subsequent

transmission. Also the age of acquiring infection is the major determinant of the incidence and prevalence rates (Ezegbudo et al., 2004).

Also, it would be necessary to reemphasize the methods of prevention of transmission of these viruses, and to ensure their implementation in order to reduce the viral levels and therefore avoid the long-term sequelae (Mabayojé et al., 2010). The observations that age was apparently statistically associated with prevalence of HCV antibody in this study disagrees with those made by Sule et al. (2009) in Lokoja, Kogi State, Nigeria and Okonko et al. (2012b,c) in Ibadan, Nigeria. The prevalence of HCV was higher in ages less than 10 years than those in ages between 10-17 years. This is not consistent with previous observations by Odenigbo et al. (2011) that HCV prevalence rate increases with increasing age reaching a peak in persons above 30 years of age. However, it is in agreement with that reported by Jeremiah et al. (2008), Udeze et al. (2009, 2011) and Okonko et al. (2012a).

The statistically significant difference in prevalence of antibodies to HCV between males and females in the present study suggests that they were not equally exposed to HCV in disagreement with earlier findings (Ejele et al., 2006; Sule et al., 2009; Udeze et al., 2011), however this collaborates with the findings of other authors elsewhere (WHO, 1996; Inyama et al., 2005; Mustapha et al., 2007a,b; Udeze et al., 2009; Okonko et al. 2012a, b,c). There was no obvious explanation for the difference in gender as a risk factor for this HCV infection, although Bwogi et al. (2009) reported a lower prevalence of HCV in males than in females and suggested the interplay of circumcision as protective. In line with Pennap et al. (2010), this was not the case in this study even though it was in an area that male circumcision is mandatory.

In agreement with the observation of Inyama et al. (2005), Mustapha et al. (2007a,b), Udeze et al. (2009) and Okonko et al. (2012a, b,c), males in this study had higher prevalence (1.8%) of HCV antibody than their female counterparts (0.9%). This observation is not consistent with that of Ejele et al. (2006) who reported that females had higher prevalence of HCV antibody than their male counterparts in Niger Delta, Nigeria; Sule et al. (2009) reported higher prevalence of HCV antibody among females compared to males; and Udeze et al. (2011) who also reported that females had higher prevalence of HCV antibody than their male counterparts in Ilorin, Nigeria.

The low prevalence of HCV infection in this population lends a strong support to the theory that an important route of transmission of hepatitis C virus could be through needles stick injuries, blood transfusion and exposure to blood derivatives, transplanted organs injections, scarifications etc. rather than sexual contact only (Mc Lean et al., 1997). Whatever the route of transmission, there is plenty of room for health education and health promotion. Health seeking behaviour is to be encouraged and practices injurious to health should be discouraged (Opaneye et al., 2005).

In conclusion, the prevalence rate reported in this study though low, confirmed that HCV infection is prevalent among children in Ibadan, Nigeria. The results of this study have highlighted the fact that HCV infection is common in Ibadan, an urban area of Oyo State. This study showed that the prevalence of HCV antibodies are generally comparable to results obtained from similar studies carried out elsewhere. However, this study however confirmed the presence of HCV among children in Oyo State, Nigeria. This virus remains the greatest public health problem as of today. General surveillance, mass immunization and public health education to stop the spread of the infection on children in Ibadan and indeed the whole society is advocated.

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