

## Hepatitis C Virus Antibody (HCV-Ab) Co-Existing With Human Immunodeficiency Virus (HIV) And Malaria Parasites in Benin City Nigeria.

Joy Z. SAIDU<sup>1\*</sup>, Godfrey O. ORIBHABOR<sup>1</sup>, Mercy O. ASUELIME<sup>1</sup>,

<sup>1</sup>, Department of Microbiology, Faculty of Life Sciences, University of Benin, PMB 1154 Benin City, Edo State, Nigeria.

\*Corresponding author: Saidu J.Z, Tel: +2347060732723, Email: [zitgwai@gmail.com](mailto:zitgwai@gmail.com)

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### ABSTRACT:

This study determined the prevalence of Hepatitis C virus antibody (HCV-Ab), Human Immunodeficiency virus (HIV), malaria parasites and their co-infection among 323 consented outpatients attending a Government Hospital in Benin City, Nigeria. Serology was used for detection of HCV-AB and HIV while Microscopic method was used for malaria parasites detection. Also a well-structured questionnaires were used to collect data on sociodemographic from participants. Amongst the 323 participants, a seropositivity of 65(20.1%), 52(16.1%) and 289(89.5%) to HCV-Ab, HIV and malaria parasites were recorded respectively. According to gender, females had the highest occurrence of HCV-Ab 47(14.6%) than males 18(5.6%). Also males and females recorded an even co-infection of HCV-Ab/HIV of 4(1.2%) ( $P < 0.05$ ). The prevalence of HCV, HIV, malaria and co-infection among the study population imply that these infections are a threat to the human health. Health awareness programs should be implemented and HCV vaccination should be encouraged.

**Keyword:** *Hepatitis C virus, Human Immunodeficiency virus, Malaria parasites, Serology, Microscopy.*

### INTRODUCTION:

Hepatitis C virus infection is a contagious disease caused by hepatitis C virus (HCV), the virus can cause both acute and chronic hepatitis, ranging from a mild illness lasting few weeks, to a lifelong illness [1]. The virus is a blood borne virus, an RNA virus, from the family *Flaviviridae*. Hepatitis C was first discovered in the 1980s, when it became apparent that there was a new virus causing liver damage aside Hepatitis A or B. It was identified in 1989 and called non-A non-B Hepatitis [2]. Approximately 20% of those infected with hepatitis C, will naturally clear the virus from their body within the first 6 months, then for the remaining 80%, a chronic infection will develop [3]. Hepatitis C virus (HCV) has also been reported in the general Nigerian population [4].

Hepatitis can be transmitted commonly through, sharing of needles, transfusion of unscreened blood, HCV can also be transmitted sexually or from mother to child although this mode of transmission is less common. It cannot be transmitted through breast feeding (except the nipple are cracked and bleeding), or through casual contact for example hugging, holding hands [5].

Globally, 34 million people were living with HIV, Sub-Saharan Africa remains most severely affected, with nearly 1 in every 20 adults (4.9%) living with HIV [6]. In Nigeria, as at 2011, adult prevalence rate was estimated to be 3.7% and considering her population size of 162.2 million, an estimated 3.5 million Nigerians are living with HIV/AIDS, ranking Nigeria among the countries with the highest HIV/AIDS burden in the world [7]. HIV co-infections with HCV have been documented in adults [8] and children [9, 10] but there is a paucity of data on this subject among children in resource-limited settings. HCV may increase the rate of progression to Acquired Immune-Deficiency Syndrome (AIDS), impair immunity and increases the number of complications in persons who are co-infected with Human Immune-Deficiency Virus [11].

Malaria is a widespread disease across the seven continents of the world. Approximately 3.2 billion people are at the risk of contracting *Plasmodium* spp and in 2017, the world malaria report revealed about 219million cases of malaria and 435,000 malaria-related deaths [3]. The burden of malaria was mostly in

the sub-Saharan African region, where about 90% malaria-associated deaths occurred. Two-thirds of these deaths were in children aged <5 years [12]. Malaria is transmitted through the bite of a female anopheles mosquito. *Plasmodium* spp and HCV, share some similarities in their pathogenesis especially during their development within the liver cells [13, 14]. Malaria and HCV co-infection is largely unstudied, but due to their epidemiologic similarities, it is possible that susceptible persons can contract both pathogens. Hepatitis and malaria are highly endemic in most parts of Nigeria. Both Hepatitis and malaria can coexist in one patient often times may be confused and misdiagnosed [15], hence the need to ascertain the seroprevalence and co-infection of HCV, HIV and malaria parasites in the study population.

### MATERIALS AND METHODS

**Study Design:** This study is a population-based, descriptive cross sectional design. A questionnaire comprising of multiple questions regarding patient demographic, was collected from each consented patient attending the Government Hospital Benin in City Edo State, Nigeria.

**Study Area:** The study was conducted among people attending a Government hospital located in the serene Centre of Benin City. Benin City, the capital of Edo State is within the south-south of Nigeria lying between 6° 20' North latitude and 5° 37' East longitude. It is situated approximately 40km North of the Benin River and 320km by road East of Lagos. The city has a humid climate and two (2) climate seasons; the rainy and dry season. The rainy season is between April and October with average rainfall of 250cm. The dry season last from November to March and also a cold humid and dusty harmattan period between December and January. The average temperature ranges between 22 °C in the rainy season and 28°C in the dry season. The total human population density in 2015 was 1,200/km<sup>2</sup>.

**Inclusions and Exclusions:** Inclusion criteria: The general population of both males and females that gave their consent

were recruited and included in the research. Exclusion criteria: The general population both males and females who refused to give their consent.

**Sample Collection:** A total of 323 blood samples were collected from consented patients. All materials required for

the collection of blood samples was assembled and was labeled with the patients' identification number and date. Blood samples (5ml) were collected via venipuncture with the assistance of laboratory scientist from consented patient into EDTA (Ethylene Diamine Tetraacetic Acid) bottles immediately. The blood samples was immediately used to prepare blood films on clean grease free slides for malaria parasite test. The blood in the EDTA bottles was centrifuged at 1000rpm for 10minutes. The plasma was collected into clean container and was stored by freezing at -4°C till when needed for HCV test.

**Hepatitis C virus Antibody (HCV-Ab) Test:** HCV-Ab was detected using ELISA (Enzyme Linked Immunosorbent Assay) test according to the manufacturer's instruction (Bioneovan, China). Optical density (OD) read at 450nm with the dual filter plate reader and interpreted according to the manufacturer's instructions.

**HIV Test:**

The HIV 1 and 2 Human Immunodeficiency Virus Rapid Test Strip was used for the detection of antibodies to HIV 1 and 2 from the subject's plasma. During testing 2-3drops of plasma specimen of subjects was dropped on the strip placed on a flat surface and allowed to stand for 5-10mins before taking the results. If the specimen contains antibodies to HIV 1 and/or HIV 2, a coloured line will appear in the test line region indicating a positive result. If the specimen does not contain HIV 1/HIV 2 antibodies a coloured line will not appear in the test line region, indicating a negative result. To serve as a procedural control a coloured line will always appear in the control line region indicating that proper volume has been added and membrane wicking has occurred.

**Malaria Parasite Examination:** Malaria parasite diagnosis was done using the Giemsa stain microscopic method as described by Cheesbrough, 2005 [16]

**Data Analysis:** Results from test analysis and data from questionnaires were reduced to percentages and presented on tables. Statistical analysis was carried out using SPSS Version

16 and with p-values less than 0.05 (p<0.05) taken to be significant at 95% Confident Interval.

**RESULTS**

A total of 323 participants were enrolled in the study. A total number of 65(20.1%) were seropositive to HCV-Ab, 52(16.1%) to HIV and 289(89.5%) to malaria parasites. There was co-infection of HCV-Ab and HIV 8(2.5%) and HCV-Ab with malaria parasites 59(18.3%) (Table 1). Table 2 shows the Socio-Demographic characteristics and Seroprevalence of Hepatitis C virus Antibody and Co-Infection with HIV and Malaria parasites among Participants. Age group 20-29 had the highest occurrence of 18(5.6%), followed by age group 30-39 17(5.3%) and the least occurrence was among age group 0-10 with 2(0.6%), There was co-infection of HCV-Ab with HIV and malaria parasite (P >0.05). Amongst the 323 participants, females recorded the highest participants of 239 than males 84, where females recorded more HCV-Ab of 47(14.6%) than the males 18(5.6%). Both sexes recorded equal co-infection of 4(1.2%) to HCV-Ab/HIV, which is statistically significant (P= 0.03). In the same vein, females had the highest record of malaria parasites than males, 41(14.2%), 18(6.2%) respectively.

In terms of level of education, those with secondary education recorded the highest of HCV-Ab 30(9.3%), also has the highest co-infection of HCV-Ab/HIV 5(1.6%) and HCV-Ab/malaria parasites 28(9.7%), even though it was not statistically significant. In occupational category, students showed more of HCV-Ab 18(5.6%) and had the highest HCV-Ab/malaria parasites co-infection 16(5.5%), though it was not statistically significant.

The Pregnancy related prevalence of Hepatitis C virus antibody (HCV-Ab), Human immunodeficiency virus (HIV), malaria parasites and their Co-infections (Figure 1). A total of 17(5.3%) pregnant women tested positive to HCV-Ab and 48(14.8%) who were not pregnant but positive to HCV-Ab, Added to this, 16(5.0%) of the pregnant women were reactive to HIV, while 36(11.1%) though not pregnant but reactive to HIV. This was not statistically significant (P>0.05).

**Table 1: Seroprevalence of HCV-Ab, HIV and Malaria parasites and their Co-infection among participants**

Variables	Number Examined	Number Positive(%)	Number Negative(%)
HCV-Ab	323	65(20.1)	258(79.9)
HIV	323	52(16.1)	271(83.9)
Malaria parasites	323	289(89.5)	34(10.5)
HCV-Ab/HIV	323	8(2.5)	315(97.5)
HCV-Ab/Malaria parasites	323	59(18.3)	264(81.7)

**Table 2. Socio-Demographic Characteristics and Seroprevalence of HCV-Ab and Co-Infection with HIV and Malaria parasites Among Patients.**

Variables	Number examined	HCV-Ab Positive(%)	P Value	HCV-Ab/HIV Positive(%)	P Value	HCV-Ab/MP Positive(%)	P Value
<b>Age</b>							
0-9]	4	2(0.6)		1(0.3)		2(0.7)	
10-19	15	5(1.5)		2(0.6)		5(1.7)	
20-29	89	18(5.6)		2(0.6)		15(5.2)	
30-39	98	17(5.3)	0.74	0	0.75	16(5.5)	0.72
40-49	42	4(1.2)		2(0.6)		4(1.4)	
50-59	47	10(3.1)		1(0.3)		9(3.1)	
>60	28	9(2.8)		1(0.3)		8(2.8)	
Total	<b>323</b>	65(20.1)		8(2.5)		59(20.4)	
<b>Sex</b>							
Male	84	18(5.6)		4(1.2)		18(6.2)	

Female	239	47(14.6)	0.73	4(1.2)	0.03	41(14.2)	0.40
Total	323	65(20.1)		8(2.5)		59(20.4)	
<b>Level of education</b>							
Primary	63	13(4.0)		0		11(3.8)	
Secondary	127	30(9.3)		5(1.6)		28(9.7)	
Tertiary	129	21(6.5)	0.31	3(0.9)	0.54	19(6.6)	0.62
None	4	1(0.3)		0		1(0.3)	
Total	323	65(20.1)		8(2.5)		59(20.4)	
<b>Occupation</b>							
Trader	77	15(4.6)		0		14(4.8)	
Student	72	18(5.6)		1(0.3)		16(5.5)	
House wife	22	4(1.2)		1(0.3)		2(0.7)	
Medical Practitioner	8	2(0.6)		1(0.3)		2(0.7)	
Self employed	38	7(2.2)	0.73	0	0.03	7(2.4)	0.84
Civil servant	28	2(0.6)		0		2(0.7)	
Unemployed	10	2(0.6)		1(0.3)		2(0.7)	
Retired	21	5(1.5)		1(0.3)		5(1.7)	
Others	47	10(3.1)		3(0.9)		9(3.1)	
Total	323	65(20.1)		8(2.5)		59(20.4)	

## DISCUSSION

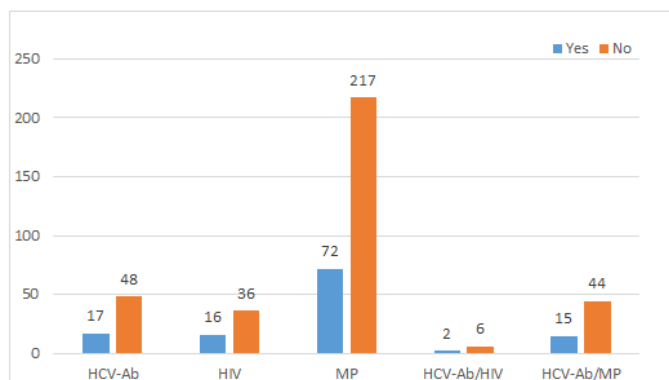


Figure 1: Pregnancy related prevalence of Hepatitis C virus antibody (HCV-Ab), Human immunodeficiency virus (HIV), malaria parasites and their Co-infection. P value >0.05

The study was aimed at surveying the prevalence of Hepatitis C virus antibody (HCV-Ab) co-existing with Human Immunodeficiency virus (HIV) and malaria parasites in Benin city Nigeria. The prevalence of HCV-Ab, HIV and malaria parasites was 65(20.1%), 52(16.1%) and 289(89.5%) respectively. There was co-infection of HCV-Ab/HIV 8(2.5%) and HCV-Ab/malaria parasites 59(18.3%). In comparing the prevalence of HCV-Ab 65(20.1%) in this study, is higher than 13.5% recorded by Okwori et al [17] in North Central Nigeria, 9.5% by Ameh et al, [18] in North East of Nigeria, 24 (7.0%) by Ojide et al [19], Haftom et al [20] in Addis Ababa Ethiopia, Conversely the co-infection of HCV-Ab/HIV was 2.5% which is seen to be lesser than 7.0% reported by Ojide et al [19], 8.2% by Agwale et al [21], 14.7% reported by Balogun et al [22]. But closely similar to the work of Adewole *et al*, who found a similar rate of HIV/HCV co-infection in their study with a prevalence of 2.3% [23], and Tremeau-Bravard et al recorded 2.3% [24]. Data relating to the prevalence of co-infection for both viruses are still reported in Nigeria. This is because these viruses on their own are not only endemic in our environment, but also sharing similar routes of

transmission, there is need to intensify efforts to get HIV infected individuals routinely screened for HCV and other hepatic viruses in Nigeria as recommended by United State and Europe guidelines [25] Such guideline, if adopted, will lead to early detection of co-infection, treatment and management of cases.

Age group 20-29 had the highest positivity to HCV-Ab 18(5.6%) followed by age group 30-39 with 17(5.3%) which is comparable with the study carried out by Mohsen *et al* [26] who reported a high prevalence among patients aged <30 of age. These age group also had the highest co-infection of HCV-Ab/HIV. The prevalence reported in this study might be as a result of these population involved in high risk behaviours such as incessant sexual activities, abuse of drugs and skin piercing which predisposes them to infection with Hepatitis virus.

Females tend to have more of HCV-Ab 47(14.6%) than male 18(5.6%) which is in agreement with Ojide et al [19] who recorded higher occurrence of HCV-Ab in females 18 (7.1%) than in males 6(6.7%). Furthermore Lesi *et al* [27] reported a higher prevalence among the female patients (37.5%) than the male patients (18.8%). However, our study disagrees with the findings of Okwori et al [17], who reported a high prevalence in males (12.7%) than females (2.1%), who opined that the high frequency of HCV among the male patients could probably be as a result of higher frequency of exposure to risk factors associated with the viruses such as injection of drug use, unprotected sex and having more than one sex partners as well as occupation and behaviours [28].

From our result, pregnant women were positive to HCV-Ab 17(5.2%) and to HIV 16(5.0%) and a co-infection of 2(0.6%). The prevalence of 0.6% HCV-Ab/HIV co-infection in this study is seen to be lesser than 1.5% reported by Ezechi et al [29] and Adesina et al [30] from Ibadan, Higher prevalence of 4.9% and 12.3% have however been reported in USA (Texas) and Europe [31, 32] which was attributed to intravenous drug use in these populations. At present intravenous drug use is not a major challenge in pregnant women in our environment and thus may have accounted for the lower prevalence.

## CONCLUSION

Hepatitis C virus, HIV and Malaria are common diseases in Nigeria and yet so little percentage knows about the HCV disease. The prevalence of HCV and co-infection with HIV and malaria parasites is seen to be on the increase. The screening of Hepatitis C should be done regularly among HIV/AIDS patients, as the choice of antiretroviral and drugs used would differ according to the diagnostic outcome. Deliberate efforts should be made to create awareness and enlighten people on the diseases, the dangers and preventive measures.

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