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Assessment of Hepatitis A, B and C Virus Positive Individual within Abuja Internally Displaced Persons Camps

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ABSTRACT: Hepatitis A, B and C Virus have become an important factor of mortality. The aim of this research was to assess HAV, HBV and HCV infected individuals within the Internally Displaced Persons Camps Abuja, Nigeria. However, a descriptive cross sectional research design was adopted where blood samples from 450 respondents were collected within the three Camps and screened for Hepatitis A, B and C positive individuals. The obtained data were analyzed using the SPSS Version 22.1 Software. The Statistical Tests performed were x^2 and Pearson Correlation with Significant difference at the threshold $p \leq 0.05$. A total of 86 samples were screened for Hepatitis A, B and C virus out of 450 samples collected for Hepatitis prevalence with Hepatitis B and C virus recording the highest prevalence of 9.3% and 6.9% as compare to Hepatitis A (2.4%) with lack of awareness, contact with blood and blood product, sharing of sharp objects, poor sanitary condition, consumption of contaminated food and water as some of the root cause of Hepatitis. It's however concluded that Hepatitis infection is a great concern at the internally displaced persons Camps Abuja. Consequently, from these facts, the routine screening of these infections coupled with the vaccination of infected individuals and awareness on the root cause of infection would improve the management of Hepatitis.

Keywords: Assessment, Hepatitis, Internally Displaced Persons (IDP)

Introduction

The term "hepatitis viruses" refers to a diverse group of viruses which uses human liver as the primary target of replication and gives rise to inflammation of the liver. Their replication may result in mass destruction of liver cells (Huang *et al*., 2021). Consequences include failure of the liver to fulfill basic functions such as removal of bilirubin from the circulatory blood system. Bilirubin is a red pigment released from red blood cells as they break down and is replaced by new cells. Excessive accumulation of the pigment in the bloodstream is manifest as yellow coloration of sites such as the eyes and the palms of the hands. Another typical consequence of massive liver cell damage is release into the bloodstream of liver enzymes, including alanine transaminase (ALT) and aspartate transaminase (AST) (Singh *et al*., 2002; Planas *et al*., 2004). Hepatitis may also be caused by other systemic pathogens such as cytomegalovirus, yellow fever virus, and *Leptospira* bacteria, although the liver is not the only target of these organisms. The first two hepatitis viruses that were distinguished were simply designated A and B, because at that time there was no indication of more. As new hepatitis viruses were discovered, the alphabetical nomenclature was

retained. The range has already reached G, and there are indications of more hepatitis viruses. The nomenclature is abbreviated as HAV to HGV for hepatitis A to G viruses (Singh *et al*., 2002; Huang *et al*., 2021).

Hepatitis A virus (HAV) is among the three major enteric hepatitis viruses recently profiled from their historical perspective with adequate measure taking in curtailing the viral infection. Hepatitis A virus was initially identified as an epidemic virus, due to the fact that the viral particles are transmitted by contaminated water and food as major contributing factors in contracting the infection globally (Zuckerman, 2013; Zuckerman, 2019). The classification of hepatitis A virus has placed the virus into a member and the family Picornaviridae. The virus is been investigated to belong to a non-enveloped virus with a diameter of 25-35 nm, that is icosahedral in nature constituting a single-strand RNA (ssRNA) genome. However, HAV are found to shares similar characteristics with members belonging to enterovirus, like most polioviruses and some member of coxsackie viruses which has in the past grouped to belong to enterovirus type 71. Hepatitis A virus has been recently classified in its own genus, known as *Hepatovirus* from the initially known *Heparnavirus* (Singh *et al*., 2002).

Hepatitis B Virus infection is a viral infection that attacks the liver and can cause both acute and chronic disease. The virus is transmitted through contact with the blood or other body fluids of an infected person. An estimated 257 million people are living with hepatitis B virus infection. In 2015, hepatitis B resulted in 887,000 deaths, mostly from complications such as cirrhosis and hepatocellular carcinoma in Europe. It is an important occupational hazard for health workers. However, it can be prevented by currently available safe and effective vaccine (Flynn *et al.,* 2017). Hepatitis B virus infection is a potentially life-threatening liver infection caused by the hepatitis B virus (HBV); it is a major global health problem. It can cause chronic infection and puts people at high risk of death from cirrhosis and liver cancer. A vaccine against hepatitis B has been available since 1982. The vaccine is 95% effective in preventing infection and the development of chronic disease and liver cancer due to hepatitis B virus (Zhang *et al.,* 2019; Huang *et al*., 2021).

Hepatitis C virus infection is a liver disease caused by the hepatitis C virus. The virus can cause both acute and chronic hepatitis, ranging in severity from a mild illness lasting a few weeks to a serious lifelong illness. The hepatitis C virus is a blood borne virus and the most common modes of infection are through exposure to small quantities of blood. This may happen through injection drug use, unsafe injection practices; unsafe health care and the transfusion of unscreened blood and blood product (Averhoff *et al.,* 2012). Globally, an estimated 71 million people have chronic hepatitis C infection. However, a significant number of those who are chronically infected will develop liver cancer. Antiviral therapy can cure more than 95% of persons with hepatitis C infection, thereby reducing the risk of death from liver cancer and cirrhosis, but access to diagnosis and treatment is low (WHO, 2021). There is currently no vaccine for hepatitis C. However, there is ongoing research in this area (Alter, 2006). The current status of research on HCV infection is far behind. This is because, it is not yet possible to grow infectious hepatitis C virions in tissue culture and there is still no adequate animal model for HCV infection. These limitations have seriously hampered the understanding of HCV's replication cycle and have impeded development of new treatments (Alter, 2006; Alter, 2019).

Hepatitis A, B and C have assumed a growing concern in public health especially in Sub-Saharan Africa. The three viral infections are not only endemic in the region they equally share similar routes of transmission such as injection drug use, sexual contact or from mother to child during pregnancy or birth as well as oral route. Furthermore, there are reports suggesting a more rapid progression of viral hepatitis caused by Hepatitis A, B and C viruses to end-stage liver disease and death in infected patients (Nielsen *et al.,* 2013). Hepatitis A virus (HAV), hepatitis B virus (HBV) and hepatitis C virus (HCV) are equally endemic across African continent, Nigeria inclusive (Mohammed and Bekele, 2016; Huang *et al*., 2021). The prevalence of mono-infection for hepatitis B infection in there general population ranges from 9-39% and more than 7% chronic carrier rate considered hyper endemic. The prevalence rate of HAV in Nigeria is also considerably high ranging from 5.8-12.3% (Garg *et al.,* 2012). Due to the endemic nature of these viruses in the sub-Saharan region and the shared routes of transmission and co-infections profile of EV-71 to HAV. The prevalence of co-infection varies depending on the population studied. Prevalence of HAV, HBV and HCV co-infections among Nigerian prison inmates was reported as 2.7% and 0.7% respectively (Mohammed and Bekele, 2016). The difference in prevalence is thought to be due to the differential efficacies of these viruses to the types of exposures found in the various geographical regions (Hussain *et al.,* 2012). This study assessed HAV, HBV and HCV positive individuals within the internally displaced persons Camps Abuja, Nigeria.

Material and methods

Study design: This study adopted a descriptive cross sectional design to assess the HAV, HBV and HCV positive individual in selected internally displaced persons camps Abuja, Nigeria.

Study area: Abuja is the capital and eighth most populous city of Nigeria located in the centre of the country within the Federal Capital Territory (FCT), it is a planned city built mainly in the 1980s. At the 2006 census, the city of Abuja had a population of 897,298 making it one of the ten most populous cities in Nigeria. According to the United Nations, Abuja grew by 139.7% between 2000 and 2010, making it the fastest growing city in the world. As at 2015, the city is experiencing an annual growth of at least 35%, retaining its position as the fastest-growing city in the African continent and one of the fastest-growing in the world. The indigenous inhabitants of Abuja are the Gbagyi (Gwari) and others in the area being Bassa, Gwandara, Gade, Dibo, Nupe and Koro. In light of the insecurity challenges across the country, Abuja constitutes about four (4) Internally Displaced Person (IDP) camps which are: Lugbe IDP Camp, Area One IDP Camp, New Kuchingoro IDP Camp and Kuje IDP Camp (Nwabughiogu, 2012).

Ethical approval: This study was carried out with the approval of the Health Research Ethics Committee of the FCDA Health Service Abuja, Nigeria. The approval number was FCDA/ADM/744/VOL.1/466 (Appendix 1).

Target population: A target population refers to a group of individuals from which samples are taken for measurement. It can further be define as the total group of any units which have one or more features in common that are of interest to the researcher. In this study, the population should be; male and female within the age range (0-45 years) with mostly student and civil servants well as farmers in Durumi, New Kuchigoro and Karumajiji IDPs camp Abuja.

Sample size: There are four internally displaced people camps in Abuja namely: Karumajiji, Durumi, new Kuchingoro and Kuje IDP Camp. The population for this study includes a random sample of adults and Children between the ages of 0-45 years from three selected internally displaced persons camp. According to the international organization for migration, there are 40,969 internally displaced persons in Abuja IDP camps. Using Taro Yamane's formula for finite population.

$$n = \frac{N}{1+(e)^2}$$

where n = corrected sample size,
N = population size (40,969) and
e = margin of error (0.05)

Therefore $n = \frac{46,360}{1+40969(0.05)^2}$, $= \frac{46360}{103.42} = 450.1$

which was adjusted to 450 respondents recruited for the study. However, 450 respondents returned the completed questionnaire given a response rate of 100%

Sampling techniques: The study employed multistage sampling technique. All the camps in Abuja were first clustered from which three (3) camps were selected through balloting system.

Administration of questionnaire and informed Consent Form: Structured questionnaire was administered to the internally displaced persons of the subjects to determine the risk factors associated with enteroviruses co-infection among HBV, HCV and HAV positive individuals in the camps. This help in determining the risk factors associated with enterovirus co-infection among the HBV, HCV and HAV positive individuals from whom the blood samples were collected (Wright *et al.,* 1994).

Sample collection and transportation: A total of four hundred and fifty (450) blood samples were collected using 1ml volume vacutainer syringes (150 from each three camps respectively). The samples were packaged in an ice packed cooler at a temperature of 4°C and were immediately transported to the Department of Microbiology Laboratory Faculty of Sciences, Kaduna State University and stored at -70 °C until assayed. The Rapid Diagnostic Test (RDT) kits, vacutainer tubes and syringe, cryo-vials, HAV, HBV and HCV test strips were purchased at Kaduna Central Market (Franco *et al.,* 2012).

Screening for HAV, HBV and HCV positive samples: The Rapid Diagnostic Test technique was used to screen for HAV, HBV and HCV positive samples from the total of 450 samples. Using this technique, 1ml of the sample was spinned in a centrifuge machine at 3000 rpm for 10 min, the serum was separated from the red blood cells and was dispensed into a sterile vial using pasture pipette (Wright *et al.,* 1994). The strips were aseptically removed from their foil and placed on working bench. 50 µl of the serum was applied to the sample pad of the respective strips, this was allowed to stay for 15 min and the reading was taken and recorded (Franco *et al.,* 2012).

Data Analysis: The collected data were analyzed using Statistical Package for social sciences (SPSS) version 20.00. The responses of the respondents were presented with frequency counts and percentages. The Chi-square (χ^2) statistics were used to examine significant association between the demographic values and the disease effect and P value ≤ 0.05 was considered significant.

Results

Figure 1 shows the Overall Prevalence Rates of HAV, HBV and HCV positive individual among the Internally Displaced Persons Camp within Abuja out of 450 samples analyzed, 11 (12.80%) were positive for HAV, 42 (48.80%) for HBV and 33(38.40%) for HCV.

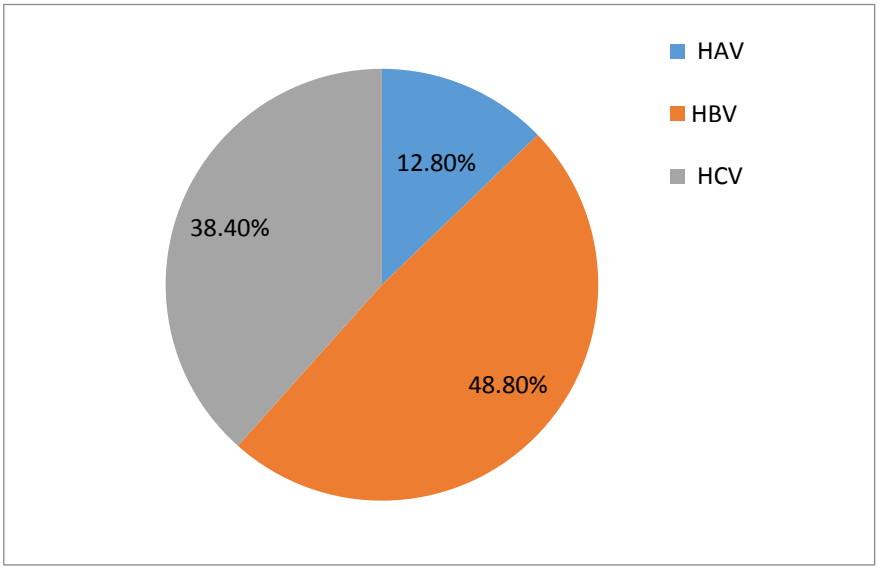

Figure 1: Overall Prevalence Rates of HAV, HBV and HCV among IDP Camps within Abuja.

Table 1 shows the possible risk factors associated with HAV, HBV and HCV infections. A total of 450 respondents responses to the questionnaires issued with a total of 272 participant resided in the camps agreed with the following risk factors with 178 disagreeing with risk factors out of which 11(4.5%) were positive for HAV with good source of drinking water, proper defaecation and improper waste disposal recording the highest prevalence rate of 4(1.6%), 3(1.6%) and 2(1.1%) with lowest prevalence of 1(0.0%) and 1(0.3%) on lack of awareness and good diet etc. The result further revealed that 42(9.33%) samples were screened for HBV with the use of sharp objects, unprotected sex and transfusion of poorly screened blood recording the highest prevalence rate of 17(3%), 9(13.4%) and 10(3.8%) as compare to lack of awareness, regular vaccination and other risk factors recording the lowest prevalence of 5(7.2%) and 1(0.3%). HCV infection recorded a total of 33(7.33%) cases with lack of awareness, transfusion of poorly screened blood and unprotected sex recording the highest prevalence rate of 12(3.5%), 11(4.2%) and 6(9.0%) with the sharing of sharp objects recording the lowest prevalence rate of 4(10.0%)

Table 1: Determined risk factors associated with HAV, HBV and HCV infection IDP camps (N=sample size (450)

Risk Factor	No. Examined	No. Positive Screened (%)			χ^2 Value	P value
		HAV	HBV	HCV		
Educated about hepatitis						
Yes	346	0(0.0)	2(0.6)	8(2.3)	6.3	0.020
No	104	1(0.9)	3(2.9)	4(3.8)		
Vaccinated against hepatitis						
Yes	298	0(0.0)	0(0.0)	0(0.0)	2.1	0.050
No	152	0(0.0)	1(0.7)	0(0.0)		
Shared sharp objects						
Yes	392	0(0.0)	11(2.8)	3(0.8)	38.6	0.001
No	58	0(0.0)	6(10.3)	1(1.7)		
Transfused blood						
Yes	264	0(0.0)	5(1.9)	4(1.5)	38.6	0.010
No	186	0(0.0)	5(2.7)	7(3.8)		
Protection during sex						
Yes	67	0(0.0)	3(4.5)	4(6.0)	12.1	0.001
No	383	0(0.0)	6(1.6)	2(0.5)		
Good source of drinking water						
Yes	310	0(0.0)	0(0.0)	0(0.0)	8.0	0.001
No	140	4(2.9)	0(0.0)	0(0.0)		
Eat good diet						
Yes	391	0(0.0)	0(0.0)	0(0.0)	2.0	0.050
No	59	1(1.7)	0(0.0)	0(0.0)		
Proper waste disposal						
Yes	189	0(0.0)	0(0.0)	0(0.0)	4.0	0.020
No	261	2(0.7)	0(0.0)	0(0.0)		
Proper defaecation						
Yes	189	1(0.5)	0(0.0)	0(0.0)	6.1	0.019
No	261	2(0.8)	0(0.0)	0(0.0)		

Key: **No**. = number, **HAV** = Hepatitis A Virus, **HBV** = Hepatitis B Virus, **HCV** = Hepatitis C Virus, CV= Critical value

Discussion

The samples were carefully screened and tested for the positive individual from the IDPs with the highest prevalence rates of 6.9% and 9.3% positive individual screened for HBV and HCV from the whole population with lowest prevalence rate of 2.4% positive individual for HAV representing the entire study. This could be as a result of the vulnerability of the IDPs to the risk factor associated with the cause of viral infection. The highest prevalence rate of HBV and HCV recorded might due to the exposure of IDPs to the infected individuals, sharing of sharp objects and lack of awareness on the root cause of viral infection with the lowest prevalence recorded for HAV which may be connected to the fact that most IDPs had a poor hygiene practice as well as poor source of drinking water. Because HAV is primarily transmitted through faecal oral route (FOR) due to consumption of contaminated food or water and poor hygiene practice. This finding is in line with the study of Khan *et al*. (2018) that carried out a similar research at the internally displaced persons camp and concluded that, the prevalence rate of an infection varies from camp to camp with no significant different ($P<0.05$) in the type of hepatitis within the three different camps as both IDPs in the camps share common materials as well as the same standard of living respectively.

On the basis of possible risk factors that may be associated with Enterovirus (EV71) co-infection among HAV, HBV and HCV positive individuals in the study area, a total of four hundred and fifty (450) questionnaires administered. A high number of respondents agreed with the risk factors to be associated with EV-71 co-infector among Hepatitis A, B and C positive individual as compare to those that disagreed with the risk factors responsible for the cause of Enterovirus (EV-71) co-infection among hepatitis positive individual within internally displaced

person (IDPs) Camps. Considering the number of positive individual screened during the research, a high number of positive individual in the study population were screened for hepatitis B and C virus representing 36.7% of the total population compared to HAV diagnosed with low cases of infection rate of about 4.52% of the entire population. When compared to the highest rates of positive samples screened for HBV and HCV, the number of positive samples screened for HAV was lower compared to the rate of HBV and HCV from about 272 participants that responded "Yes" and 178 that responded "No" to the risk factors during the screening within the Camps. The low rate of hepatitis A virus may be due to the fact that most IDPs have heard or are aware about the causes of hepatitis as most of them eat good diet and have proper way of disposing waste with portable drinking water within IDP Camp as well as their avoidance to those factors responsible for infection with a statistical difference ($p<0.05$) between the risk factors and the rate of HAV infection in the Camp because hepatitis A virus is transmitted via poor sanitary condition and consumption of contaminated foods or water via faecal oral route (FOR). According UNAIDS (2017), the high infection rate of hepatitis A virus is as a result of poverty, lack of good sanitation, personal hygiene and lack of awareness on the mode of transmission of the infection from infected person to the healthy individual are the root cause of hepatitis A virus. On the co-infection rate among the infected individuals, a single case of EV-71 positive sample was screened from HAV within the three Camps. This may be due to the fact that both EV71 and HAV are transmitted primarily via faecal oral route which is due to the consumption of contaminated food or water, pure hygienic practice and excessive open defaecation that finally resulted to hand-to-mouth disease with a statistical difference ($p<0.05$) on the above risk factors between the EV-71/HAV because both infections are transmitted via the above mentioned risk factors. Inadequate diet by the IDPs in the Camps have significantly increased the rate of HAV infection with a statistical difference ($p<0.05$) between the risk factor and the EV-71 co-infection profile. The rate of the infection is in agreement with the finding of Musa *et al*. (2015) who opined that lack of awareness and poor hygienic practice as well as opened defaecation as the major cause of hand to mouth diseases such as enteroviruses (EVs) or HAV which has emerged as a major public health concern with the outbreaks occurring frequently at the global scale (Bowden *et al*., 2018: Kim *et al*., 2005).

Similarly, the highest infection rate recorded for HBV and HCV may be as a result of the sexual exploitation, sharing of sharp instruments such as syringe, needles and razors. Others factors linked as a major cause of Hepatitis B and C virus are contact with blood and blood product respectively. This entails that both HBV and HCV can be transmitted through blood and blood product as well as exposure to contaminated objects. The high cases of HBV and HCV screened within the IDPs camps can further be attributed that most IDPs resided in those Camps expose themselves to unprotected sex which contribute immensely in transmission of hepatitis B and C virus with a statistical difference ($p<0.05$) between the risk factor and the infection rate. The transfusion of blood and blood product that were not properly screened also give rise to high HBV and HCV infection rate with a significance difference ($p<0.05$) between the risk factors and the rate of infection within the IDPs Camps. Other factors that may be the root cause are lack of awareness and inadequate vaccination against hepatitis with a significant difference ($P<0.05$) on the type of hepatitis on the basis of the risk factors associated with HBV and HCV virus infection within the IDPs Camps. However, sharing of sharp objects within the IDPs have greatly contributed to Hepatitis B and C infection rate with no co-infection between the EV-71 as both infections do not share similar routes of transmission with a significant difference ($p<0.05$) in the co-infection profile between EV-71 and Hepatitis B and C infected individuals. Similar result was documented by Khan *et al.* (2018) who opined that sexual exploitation, sharing of sharp object, transfusion of improper screened blood and lack of awareness on the danger of hepatitis as the major contributory factors responsible for the high rate of hepatitis among individuals.

Conclusion

Hepatitis A, B and C virus infected individuals were investigated within the IDPs Camps Abuja, where the highest prevalence rates for HBV and HCV positive individual was recorded compared to HAV infected individuals. On the basis of the possible risk factors associated with HAV, HBV and HCV infected persons, most of IDPs within the Camps agreed that lack of awareness, contact with blood and blood product, sharing of sharp objects as a cause of HAV, HBV and HCV. More so, poor sanitary condition, consumption of contaminated food and water are some of the root causes of HAV infection.

Recommendations

This study should be done on other subjects in addition to IDPs as well as the risk factors. A more sensitive kit should be used in subsequent studies and the samples should be assayed immediately.

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