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Full Length Research Article

PREVALENCE OF HEPATITIS A AMONG INTERNALLY DISPLACED PERSONS IN MUNICIPAL AREA COUNCIL, ABUJA - NIGERIA

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ABSTRACT
Hepatitis A can be life threatening especially in epidemics and can cause extensive economic loss. Hepatitis A virus, the cause of hepatitis A found is mostly present in faeces of persons who are infected and spread by ingesting water or food that has been contaminated. This study was carried to determine the seroprevalence of hepatitis A, among internally displaced persons in Municipal Area Council, Abuja, Nigeria. Structured questionnaires were used to generate information on socio-demographic and risks factors. Four hundred and fifty participants (142 males, 308 females) were tested for hepatitis A virus using immunochromatography method. Statistical tools used to investigate data collected were Chi-square analysis, bivariate analysis and multiple logistic regression analysis (MLRA). The mean age of the population studied was 22 years. The seroprevalence of hepatitis A among the IDPs was 2.4%. Bivariate analysis did not disclose any significant risk factors to hepatitis A. However, multiple logistic regression revealed there was a non-significant 2.6 higher odds of contracting hepatitis A in age group less than 24 years and 1.6 higher odds in subjects whose area of defaecation was in the bush. This study concludes that hepatitis A had a prevalence of 2.4% among the internally displaced persons in the 3 camps studied. However creation of awareness on hepatitis A and factors that pose risk to infection is recommended within the IDP camps, effective vaccinations should be made accessible to the residents of the camps to prevent possible epidemic.

Keywords: Hepatitis A, Internally displaced persons, Abuja, Nigeria, Prevalence.

INTRODUCTION

Hepatitis denotes inflammation of the liver (Dienstag *et al.*, 2015). This could be infectious (viral, bacterial, parasitic fungal) or non-infectious (due to alcohol, autoimmune ailments, drugs, and, metabolic). Globally, virus-related hepatitis causes about 50% cases of severe and chronic hepatitis (World Health Organization (WHO), 2017). In 1990, viral hepatitis became the 10th chief cause of death universally, this number rose to the 7th in 2013, a cause for public health concerns (Stanaway *et al*., 2016). Hepatitis A is caused by Hepatitis A virus which is found in faeces of persons infected and is spread through ingesting water or food that has been contaminated (Dienstag *et al.*, 2015). Some form of intercourse between persons such as oral and anal sex spike up risk of contracting hepatitis A (Matheny and Kingery, 2012). HAV infections are slight most times and majority recover fully and remain immune from subsequent infections (Aggarwal and Goel, 2015). Hepatitis A can be life threatening in cases of epidemics and cause extensive economic loss (Global Burden of Diseases (GBD), 2015). Globally, 1.4 million symptomatic cases of hepatitis A and about 114 million symptomatic and asymptomatic cases with a total of 11,200 deaths were reported due to hepatitis A in 2015 (GBD, 2015). Vaccines are obtainable to prevent HAV infection (Franco *et al*., 2012). The Middle East, Central, Africa, Asia, South America and all less-developed nations possess higher hepatitis A prevalence than developed nations (Jacobsen, 2018). Seroprevalence rates in Central and South American countries were reported as 55.0% in Argentina, 64.7% in Brazil, 58.1% in Chile, 81.0% in Mexico and 55.7% in Venezuela (Franco *et al*., 2012). Hepatitis A rate of prevalence in African countries like Kuwait and Sierra Leone were 28% and 97% respectively (Franco *et al*., 2012). In Nigeria, Okara *et al*. (2017) stated that prevalence of 2.94% HAV infection in hospital subjects in Abuja. Also, a community-based prevalence study done in Nigeria by Ikobah *et al*. (2015) described that the prevalence of frequency of 55.2% HAV infection in community-based study carried out in Cross River State, Nigeria. Published studies on the prevalence of hepatitis A, among Internally Displaced Persons (IDPs) in Nigeria is limited, thus, this research focuses on finding out the seroprevalence of hepatitis A among persons residing in some IDP camps in Abuja, the capital of Nigeria. It will also scale up hepatitis A screening for IDPs resident in the camps.

MATERIALS AND METHODS

Study Area: This study was carried out in Abuja; the Federal Capital Territory (FCT) of Nigeria which lies between latitude 8.25° and 9.20° north of the equator and longitude 6.45° and 7.39° east of Greenwich Meridian with an area of 7,315 km^2 (Cybriwsky, 2013). The internally displaced persons camps included in the study were Goza and Bama (Durumi), New Kuchingoro and Karumajiji IDP camps, all within the Municipal Area Council (AMAC) Abuja.

Ethical Clearance: Ethical approval for the study was granted by The Federal Capital Territory, Health Research Ethics Committee. Permission into the IDP camps was also granted by the Abuja Municipal Area Council. Participation in the study was fully voluntary and informed written consent was obtained from all participants.

Inclusion and Exclusion Criteria: Subjects who were resident on the IDP camp and gave consent were included in the study while those who did not give consent were excluded from the study.

Sample size Determination: This was done using the formula below as adopted by Cochran (1977). $N = (Z^2) \times p(1-p)/(D^2)$
Where;

N = required sample size
D = margin of error = 0.05
P = percentage of existing prevalence of hepatitis B and C infection in the research referenced = 13.2% = 0.132 (Pennap *et al*., 2010)
Z = the standard normal deviation corresponding to 95% Confidence Interval (CI) = 1.96

Inputting the figures into the sample size formula,
$N = (1.96)^2 x\ 0.132\ x\ (1- 0.132)/ (0.05)^2 = 3.84\ x\ 0.132\ x\ 0.868/0.0025 = 175$
Calculated minimum sample size of 175 was increased to 450 to enhance reliability by giving greater precision and power. Therefore, a sampling size of 450 was used in this study.

Sample collection: About 4mls of blood was aseptically collected by venipuncture into sterile plain vacutainers from each study subject and the specimen container was labeled appropriately with the subject's name and code number.

Sample Processing: Serology test using the immunochromatographic tests (ICT) technique was used initially to screen all blood specimens for Hepatitis A virus. Specimens positive by the ICT method were then confirmed using molecular analysis. The immunochromatographic tests and the molecular analysis were carried out as directed by the manufacturer.

Statistical Analysis: All statistical analysis was done on the statistical software package STATA SE version 12. Descriptive investigations for socio-demographic factors were expressed as frequencies, percentages and measures of central tendencies. Chi square test was used to assess the risk to hepatitis A virus infections. Bivariate analysis and multivariate logistic regression were employed to further test significant association of predictor variables. A confidence interval (CI) of 95% was employed and a P-value of < 0.05 reflected significant association.

RESULTS

A total of 450 participants from three IDP camps were included in the study. There were more females 308(68.4%) who consented and also age groups less than 24years (58.9%) were more than the older age groups. A greater percentage of participants were single 237(52.7%) while 271(60.2%) participants had a primary education. Majority of the IDPs numbering 351(78%) were displaced from Borno State Nigeria.
Eleven (11) of the 450 total participants were positive for hepatitis A using the serological technique. The prevalence of hepatitis A amongst the IDPs was 2.4%.
Plates I describes the outcome of the molecular analysis of specimens for hepatitis A virus. Of six (6) sera specimens, none was positive by the conventional RT-PCR which used a set of primers targeting the 5^1 NCR genes with an expected band size of 173bps, as shown below;
The forward primer was HAV68 with sequence; 5^1-TCACCGCCGTTTGCCTAG-3^1.
The reverse primer was HAV240 with sequence; 5^1-GGAGAGCCCTGGAAGAAAG-3^1 (Costafreda *et al*., 2006).

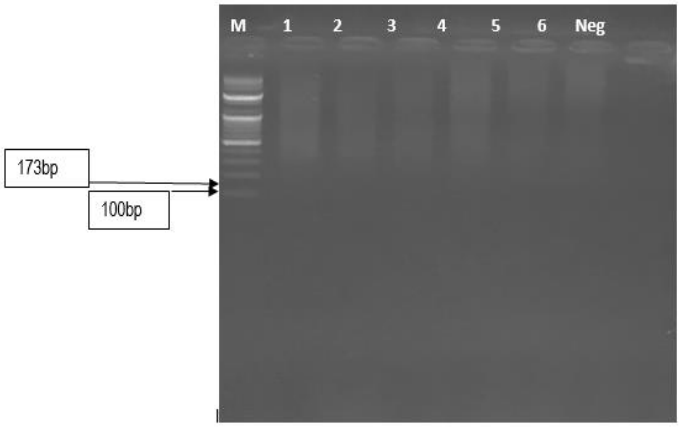

Plate 1: Agarose gel electrophoresis of 5^1 *NCR* gene. M (BIONEER, DNA marker; 100bp), 1-6 (negative sample wells), well 7 (negative control)

After Chi-Square analysis, there was no significant association between socio-demographic characteristics and the prevalence of hepatitis A among the IDPs, (*P*>0.05), (Table 1).

Table 1: Prevalence of Hepatitis A by X^2 Analysis of the Socio-Demographic Variables

Characteristics	HAV+ (%) n=11	X^2	P-value
Age group(years)			
<=24	6 (54.5)	0.09	0.77
>= 25	5 (45.5)		
Sex			
Female	8 (72.7)	0.10	0.76
Male	3 (27.3)		
Marital status			
Married	7 (63.6)	1.64	0.20
Not married	4 (36.4)		
Year of residency			
1-3	3 (27.3)	0.16	0.69
>3	8 (72.7)		
Level of Education			
Primary	4 (36.4)		
Secondary	5 (45.4)	4.08	0.23
Tertiary	1 (9.1)		
No formal	1 (9.1)		

Key: HAV: Hepatitis A virus X^2: Chi square analysis, +: positive, n: number of participants positive, %: percentage

The odds of contracting Hepatitis A is 17% higher in the younger age group and 20% more in females than in males. There were also higher odds in the married, those with no previous knowledge of the infection, those whose source of water was from the camp borehole and those who defecated in the bush. However, all the associations were not statistically significant (*P*>0.05), (Table 2).

Table 2: Bivariate Logistic Analysis of the Risk Factors of Hepatitis A

Risk factor	HAV (+) %	OR	95% CI	P value
Age				
<=24	6 (54.5)			
>24years	5(45.5)	0.83	0.25-1. 77	0.76
Sex				
Female	8(72.7)			
Male	3 (27.3)	0.80	0.21-3.0	0.75
Marital status				
Married	7 (63.6)			
Not married	4 (36.4)	0.45	0.13-1.56	0.21
Educational status				
Primary	4(36.4)			
Secondary	5(45.4)	0.31	0.09-1.12	
Tertiary	1 (9.1)			
Non formal	1 (9.1)	0.48	0.05-4.42	
Previous knowledge of hepatitis				
Yes	3(27.3)	0.45	0.12-1.7	0.25
No	8(72.7)			
Source of drinking water				
Borehole	10 (90.9)		0.1-6.5	0.846
River	1 (9.1)	0.81		
Area of defecation				
Pit toilet	2(18.2)			
Bush	9(81.8)	0.91	0.19-4.32	0.91

Key: HAV: Hepatitis A virus, (+): positive, OR: Odds ratio, CI: Confidence interval

The multiple regression analysis of hepatitis A further reveals that the odds of contracting hepatitis A was twice in age group less than 24 years than older age group. Higher odds of getting the infection was also noted in females, the married, those with either primary or tertiary education, those whose source of water was from the camp borehole, those who used the bush for defecation and those without previous knowledge of the infection. However, these relationships were not statistically significant, (*P*>0.05), (Table 3).

TABLE 3: Multiple Logistic Regression Analysis of Hepatitis A Risk Factors

Risk factor	HAV+ (%)	AOR	95%CI	P value
Age				
<=24	6 (54.5)	2.69	0.5-14.22	0.24
>24years	5(45.5)			
Sex				
Female	8(72.7)			
Male	3(27.3)	0.63	0.11-3.56	0.63
Marital status				
Married	7 (63.6)			
Not married	4 (36.4)	0.32	0.06-1.78	0.19
Educational status	4(36.4)			
Primary	5(45.4)	0.35	0.10-1.49	
Secondary	1 (9.1)			0.16
Tertiary	1 (9.1)	0.40	0.04-4.45	
Non formal				
Previous knowledge of hepatitis	3(27.3)			
Yes	8(72.7)	0.49	0.10-2.37	0.37
No				
Source of drinking water				
Borehole	10 (90.9)			0.41
River	1(9.1)	0.713	0.32-1.58	
Area of defecation	2(18.2)			
Pit toilet	9(81.8)	1.6	0.29-9.18	0.57
Bush				

Key: HAV: Hepatitis A virus, (+): positive, AOR: adjusted odds ratio, CI: confidence Interval

DISCUSSION

The prevalence of Hepatitis A in the study was 2.4% and can be compared to a prevalence of 2.9% recorded by Okara *et al*. (2017). This reported prevalence is higher than a prevalence of 0.67% reported by Waje *et al*. (2017), their prevalence regarded as hypo-endemic was attributed to good sanitation and safe health measures in public eating facilities within the area studied. The report of this study is however low when compared to studies with high prevalence rates of 82.3%, 77.2% and 55.2% as reported by Adeyemi and Omolade (2017), Aliyu (2015) and Ikobah *et al*. (2015) respectively. Okara *et al*. (2017) attributed the low prevalence to greater awareness and improved food hygiene while Ikobah *et al*. (2015) and Aliyu (2015) attributed the high prevalence to lack of awareness and low socioeconomic status.

Test for association by Chi square analysis in this research presented no significant relationship between the socio-demographic characteristics of IDPs and the status of hepatitis A (X^2 <1, *P*>0.05). In this study, the odds of contracting the Hepatitis A was 17% higher in the younger age group of less than 24 years and 20% more in females than males possibly because the younger age group were not particular about good hygiene practices and the males resident in the IDP camps adhered better to good hygiene practices than the females. The higher prevalence of HAV infection in those younger than 24 years reported in this study can be compared with studies by Waje *et al*. (2017) which reported higher prevalence in age group 11-20 years, it however contradicts reports by Okara *et al*. (2017) where HAV infection was higher among subjects within the age bracket 21 to 40 years and more in males than in females. Reports by Aliyu (2015) also contradicts findings from this study as higher prevalence was reported among males than females, however age groups of 6 to 9 years were reported to have higher prevalence of hepatitis A infection. Ikobah *et al*. (2015) reported higher prevalence of hepatitis A infection among female participants than in males and also a higher prevalence in children aged 5 to 13 years who had 13% more risk of being hepatitis A positive than other age groups, these findings are comparable with this study. Higher odds of having hepatitis A infection was also recorded in this study at the bivariate analysis level among those who were married, those with no previous knowledge of the infection, those whose source of water was from the camp borehole and those who defecated in the bush. This points to the fact that awareness of the modes of transmission of infection, better sanitary conditions in the camp environment and adherence to good hygiene are measures that can reduce transmission of infection among the IDPS. It would also be important to run analysis on the source of drinking water of IDPs in the camp to rule out faecal contamination. However, the association between these risk factors and hepatitis A were not statistically significant (*P*>0.05). Waje *et al*. (2017) however, reported significant association recorded between age group 11 to 20 years and hepatitis A but also reported no significant relationship between gender, level of education and hepatitis A positivity. Aliyu (2015) recorded higher odds of having HAV infection among males than females and gender and age were not statistically significant to being Hepatitis A positive. Ikobah *et al*. (2015) reported no statistical significance between gender and HAV infection.

The multiple logistic regression analysis reveals that the odds of contracting hepatitis A was 2.6 times higher in age groups less than 24 years than older age groups. Higher odds of having the infection was found among the females, those married, those with either

primary or tertiary education, those whose source of water was from the camp borehole, those who used the bush for defaecation and those without previous knowledge of the infection. However these associations were not statistically significant. Ikobah *et al*. (2015) also reported after a multiple logistic regression, no statistically significant association in faecal disposal method, number of persons in the household, duration of residence, source of drinking water and gender with contracting hepatitis A infection. However, he found that age and social class were statistically significant with hepatitis A infection.

Globally, developed countries have very low prevalence of HAV infection usually in less than 50% of its population, while less developed counties have high prevalence usually in more than 90% of its population (Jacobsen, 2018). Middle-income countries have low and intermediate prevalence of HAV infection (Franco *et al*., 2012; Meryem *et al*., 2018). Patterson *et al*. (2019) carried out a review on HAV infection in Africa and reported that Africa does not have a high prevalence of hepatitis A. All age groups have same risks of infection and South Africa is moving from a high prevalence to an intermediate prevalence. Patterson *et al*. (2019) however concluded that the environment, economy, social and economic factors play major roles in the prevalence of hepatitis A in the various countries.

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