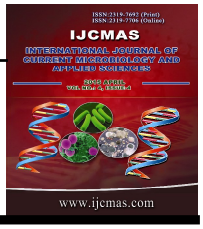
Int.J.Curr.Microbiol.App.Sci (2015) 4(4): 948-954

International Journal of Current Microbiology and Applied Sciences
ISSN: 2319-7706 **Volume 4 Number 4 (2015) pp. 948-954**
http://www.ijcmas.com



Original Research Article

Hepatitis A Virus Infection among Primary School Pupils in Potiskum, Yobe State, Nigeria

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A B S T R A C T

Viral hepatitis is a major public health problem in developing and developed countries worldwide. Information regarding hepatitis A in Nigeria and Africa is scanty, although some Studies of hepatitis Avirus (HAV) seroprevalence in sub-Saharan Africa was found a very high anti-HAV IgG prevalence rates and most affected are children. Children play an important role in spreading HAV. They are the ones most likely to become infected and because they rarely have symptoms, they are a silent source of infection for others. There is scarcity of information regarding hepatitis A virus in Yobe State. This research is geared to report data onhepatitis A virus in Yobe State North Eastern Nigeria. Methodology: 5ml of blood were aseptically collected by venepuncture from each of 180 consented pupil into sterile clean test tube containers, after administration of questionnaire. The pupils were randomly sampled from 3 primary schools (Army Children Primary School, Central Primary School and Racecourse Primary School) in Potiskum town. The serum samples were screened of hepatitis A virus immunoglobullins (IgG and IgM). The data obtained were analysed statistically by Chi square or Fisher's exact test and P-value ≤ 0.05 were considered significant. Result: The total prevalence of hepatitis Avirus immunoglobulin among studied population is 77.2%. Racecourse Primary School has the highest prevalence of hepatitis A virus IgG which is 75%, while Central Primary School has the highest prevalence forhepatitis A virus IgM. Male pupils have the highest prevalence of hepatitis A virus IgG and IgM. While age group between 6-9 years of age have the highest prevalence of hepatitis A immunoglobullins compare to age group 9-12 years. It found that the distribution of hepatitis A immunoglobullins is higher among pupils with low socioeconomic status than pupil with middle or high socioeconomic status. Conclusion: Best on this high prevalence of hepatitis A immunoglobullins, there is a need for government to ensure the policy that will improve the sanitary and hygienic condition of the populace especially Primary School certain. Also mass screening of the public and immunization of the people who are not immune to hepatitis A virus should be encouraged.

Keywords

Viral hepatitis, Hepatitis A Virus anti-HAV IgG, Primary School Pupils

Introduction

Hepatitis A is an RNA virus which belong to the family *Picornaviridae* and it is the causative agent of hepatitis A. It is always transmitted by the faeco-oral route [1, 9]. Hepatitis A virus is spread through food and water contaminated by the feces of people infected with the hepatitis A virus (HAV). The virus is transmitted when the feces (stool) of an infected person reaches food or water that is ingested by a susceptible

person. It is also transmitted through close, personal contact. Also community wide epidemics, infection was transmitted from person to person in households and extended family settings. These epidemics typically spread throughout the community, and no single risk factor or risk group could be identified that accounted for the majority of cases.

Also other most common risk factors for hepatitis A infection include unreliable access to safe drinking water and other indicators of low socioeconomic status [6]. Hepatitis A virus (HAV) can cause severe acute liver disease [2, 5]. Generally, viral hepatitis is a major public health problem in developing and developed countries worldwide. Information regarding hepatitis A in Nigeria and Africa is scanty, although some Studies of hepatitis A virus (HAV) prevalence in Sub-Saharan Africa have found a very high anti-HAV IgG seroprevalence rates and most affected are children [5,10]. While many young children who become infected with the virus remain asymptomatic, older children and adults may develop jaundice and severe illness, be absent from school or work for weeks or even months, and be at risk of liver failure and death. In populations with very high rates of HAV transmission, the majority of young children and almost all older children and adults have immunologic evidence of past infection in the form of anti-HAV IgG antibodies, which usually persist for life following an initial infection [5]. Children play an important role in spreading HAV. They are the ones most likely to become infected and because they rarely have symptoms, they are a silent source of infection for others. Those most commonly infected are children [5]. When symptoms occur, usually in adults, they appear suddenly and may include fever, exhaustion, loss of appetite, nausea and abdominal discomfort, dark urine and jaundice (yellowing of the skin and eyes). Children younger than age 6 usually have no symptoms. Like all types of hepatitis viruses, HAV causes acute inflammation of the liver [5]. This study aims to determine the seroprevalence of hepatitis A virus among Primary School Children aged 1-12 years in Potiskum town, Yobe State, Nigeria.

Material and Method

Study area and population

Potiskum town is the headquarter of Potiskum local government area of Yobe State. It has an area of 559 km² and a population of 205,876 at the 2006 census. Potiskum is the commercial and agricultural center of Yobe State. The samples were collected from three primary schools all located within Potiskum town: Army children primary school, Central primary school and Racecourse Primary School. Blood samples were collected from 180 of Primary School Pupils after the administration of questionnaire to each of the pupils. The sample size was determined using formula propounded by Naing, (2003) at 95% confidence interval (CI) [11].

Ethical consideration

Ethical clearance was obtained From State Ministry of health and informed was obtained from the parents of the pupils and all the participants. Also permission to conduct the research was obtained from Local Education Authorities.

Sample collection

5ml of blood were aseptically collected by venepuncture from each consented pupil into sterile clean test tube containers. The bloods were allowed to clot at room

temperature after the test tube were kept slanted. The sera were separated by centrifugation at 3000G for 5 min. The separated sera were aspirated into clean cryogenic tube, label and stored at frozen temperature of -20 ˚C before the testing.

Hepatitis A screening

The sera sample was unfrozen or thawed. It is then screened for hepatitis A specific antibodies (anti hepatitis A immunoglobulins) IgG and IgM Enzyme Linked Immunosorbent Assay Test Tit (ELISA) (Abbott). The samples were tested by certified medical staff of University of Maiduguri Teaching Hospital (UMTH).

Statistical analysis

The data obtained were subjected to statistical analysis using statistical software package, Graphpad Prism Version 5.00 for windows (Graphpad Software, Sandiego USA, www.graphpad.com). Chi square and Fisher's exact test were used, P-value ≤ 0.05 were considered statistically significant.

Result and Discussion

Out of 180 total blood samples collected, 139 (77.2%) are sero positive for hepatitis A antibodies, of which 125 (69.4%) are IgG while 14 (7.8) are IgM. This work also found that 70% of pupils with high socioeconomic status are negative to both IgG and IgM antibodies for hepatitis A virus. Also pupils with middle socioeconomic status are 45% negative for both IgG and IgM antibodies for hepatitis A virus.

Distribution of Hepatitis A immunoglobulins in relation to primary school sampled

Racecourse Primary School have the highest number of pupils tested positive for hepatitis A IgG, which is 45 pupils (75%). And number of pupils detected with IgM hepatitis A antibodies are 3 which is (5%). The distribution of hepatitis A IgG in Army Children and Central Primary Schools are the same which is 40 pupils each and this account for (66.7%) each. In case of hepatitis A IgM, Central Primary School is higher: 6 (10%) pupils are hepatitis A IgM sero positive. In Army Children Primary School only 5 pupils are hepatitis A virus IgM antibodies positive which account for (8.3%). Using Chi square analysis, the distribution of hepatitis A IgG antibodies in this 3 primary schools is statistically significance with P-value = 0.0075. Based on this pupils attending Racecourse Primary School are more likely to be infected with hepatitis A virus, even though, hepatitis A IgM distribution in the studied primary schools are not statistically significant, this is be course the P-value obtained is greater than 0.05 which 0.6. (Table. 1) below shows the distribution of hepatitis A immunoglobullins in the 3 studied primary schools:

Distribution of hepatitis A immunoglobullins in relation to sex

In the study population 120 pupils are males and 60 pupils are females. 90 (75%) of the males are hepatitis A IgG sero-positive, while 35 (58.3%) females are hepatitis A IgG sero-positive. For hepatitis A IgM, the number of male that are seropositive are 10 (8.3%), and that of females are 4 (6.7%). Using fisher's exact test, the distribution of hepatitis A antibodies between males and females in the studied population is statistically significance with P-value = 0.026 with relative risk of 1.28 at 95% confidence interval. Hence, males are more likely to be infected with hepatitis A virus in this study, despite the fact that statistical analysis for hepatitis A IgM distribution in

relation to the sex of the pupils is not significance. (Table. 2) below shows the distribution of hepatitis A immunoglobulin in relation to sex of the pupils.

Distribution of Hepatitis A immunoglobullins in relation to age

Children within age limit of 6-9 years of age have the highest prevalence rate of hepatitis A IgG and IgM antibodies which is 70 (70%) for IgG and 10 (10%) for IgM in this study compare to age limit 9-12 years of age which has lower prevalence rate of 55 (68.8%) for IgG and 4 (5%) for IgM. Despite the difference in distribution of both IgG and IgM immunoglobullins in relation to age of studied population, the result statistical analysis using fisher's exact test shows to be non significant. (Table. 3) below shows the distribution of hepatitis A immunoglobulins with respect to age of the studied subject.

Statistical analysis

IgG

P-value = 0.87 (not significant), RR = 1.018, 95% CI= 0.8372-1.238.

IgM

P-value = 0.27 (not significant), RR = 2.000, 95% CI= 0.6513-6.141.

Distribution of Hepatitis A Immunoglobullins in Relation to Socio-economic Status (SES)

The distribution of hepatitis A IgG based on socioeconomic status is as follows: High socioeconomic status; 5 (25%), Middle socioeconomic status; 30 (50%) and Low socioeconomic status; 90 (90%). For hepatitis A IgM is as follows: High socioeconomic status; 1 (5%), Middle socioeconomic status; 3 (5%) and Low socioeconomic status; 10 (10%). The result of statistical analysis using Chi square test have shown positive correlation for hepatitis A IgG as follows: $X^2 = 49.22$, P-value = 0.0001 with df =2. Thus, it is statistically significant best on above data. Hence, it assumed that pupils from low socioeconomic class have the higher chance of getting infected with hepatitis A virus, even though statistical analysis for IgM in relation to socioeconomic status is not significant. The (Table. 4) below shows the distribution of hepatitis A virus immunoglobulins in relation to socioeconomic status.

This study have have investigated the seroprevalence of hepatitis A virus immunoglobulins (IgG and IgM) and the total overall prevalence is 77.2%. Prevalence is nearly consistence with other studies conducted in some West African Countries. For example, prevalence of hepatitis A antibodies in Liberia 80%, Senegal 100% and Cameroun 90% [3]. This of study was conducted in some other countries or have been carryout in some other states in Nigeria.

However, report of hepatitis A virus among school age children in Yobe State is very scarce. Franco *et al.*, 2012, reported the prevalence of hepatitis A antibodies in Nigerian general population to be 90%. Also similar report among urban school children in Nigeria have shown to have prevalence rate of 97% [3]. Compare to the above studied, our finding shows low percentage prevalence, reasons of this is not known and more studies that will involved much more children need to be conducted. Our finding have shows that a positive correlation existed between assumed risk factors e.g sex, age and socioeconomic status statistically with all P-values ≤ 0.05.

Table.1 Shows the Distribution of Hepatitis A Immunoglobullins in the 3 Studied Primary Schools in Potiskum

School	No tested	No. IgG (Positive)%	No. IgM (Positive)%	No. IgG, IgM (Negative)%
APS	60	40 (66.7)	3 (5.0)	16 (26.6)
CPS	60	40 (66.7)	6 (10.0)	15 (25.0)
RPS	60	45 (75.0)	5 (8.3)	10 (16.7)
Total	180	125 (69.4)	14 (7.8)	41 (22.8)

KEY
APS: Army Children Primary School; CPS: Central Primary School; RPS: Racecourse Primary School
Statistical Analysis:
IgG;
$X^2 = 9.78$, P-value = 0.0075 (significant), df = 2.
IgM;
$X^2 = 1.084$, P-value = 0.58 (not significant), df = 2.

Table.2 Shows the Distribution of Hepatitis A Immunoglobulin in Relation to Sex of the Pupils

Sex	No. Tested	IgG (Positive)%	IgM (Positive)%	IgG, IgM (Negative)%
Males	120	90 (75.0)	10 (8.3)	20 (16.7)
Females	60	35 (58.3)	4 (6.7)	21 (35.0)
Total	180	125 (69.4)	14 (7.8)	41 (22.8)

Statistical Analysis:
IgG;
P-value = 0.03 (significant), RR= 1.27, 95% CI =1.014-1.630.
IgM;
P-value = 0.78 (not significant), RR= 1.25, 95% CI = 0.4074-0.1481.

Table.3 Shows the distribution of Hepatitis A immunoglobulins with respect to age of the studied subject

Age	No. Tested	IgG (Positive)%	IgM (Positive)%	IgG, IgM (Negative)%
6-9	100	70 (70.0)	10 (10.0)	25 (25.0)
9-12	80	55 (68.8)	4 (5.0)	16 (20.0)
Total	180	125 (69.4)	14 (7.8)	41 (22.8)

Statistical Analysis:
IgG;
P-value = 0.87 (not significant), RR = 1.018, 95% CI= 0.8372-1.238.
IgM;
P-value = 0.27 (not significant), RR = 2.000, 95% CI= 0.6513-6.141.

Table.4 Shows the Distribution of Hepatitis A Virus Immunoglobulins in Relation to Socioeconomic Status**.**

Status	No tested	No. IgG (Positive)%	No. IgM (Positive)%	No. IgG, IgM (Negative)%
High (SES)	20	5 (25.0)	1 (5.0)	14 (70).0
Middle (SES)	30	30 (50.0)	3 (5.0)	27 (45.0)
Low (SES)	100	90 (90.0)	10 (10.0)	10 (16.7)
Total	180	125 (69.4)	14 (7.8)	41 (22.8)

KEY
SES; Socioeconomic status
Statistical Analysis:
IgG;
$X^2 = 49.22$, P-value = 0.0001 (significant), df = 2.
IgM;
$X^2 = 0.547$, P-value = 0.76 (not significant), df = 2.

Negative IgG and IgM antibodies to hepatitis A among pupils with higher and middle socioeconomic background was noted which is 70% and 45%. This may be due the fact that people with higher socioeconomic status tend to have a good sanitary and personnel hygiene as well as access to clean water and food. Lower prevalence of hepatitis A among pupils of higher and middle class may indicate the need for vaccination.

The result of this high prevalence rate may be attributed to poor sanitary and hygienic condition of the population included in this study because of the fact that all 3 tires of government Nigeria doesn't give much emphasis on improve sanitation and personnel hygiene. Also we found that the distribution of hepatitis A is high among pupils with low socioeconomic status. Also high prevalence among in relation to age, sex and location may indicate the endemicity of the virus in the study area. This is consistence with the work of Franco *et al.*, 2012. Which stated that: in less developed countries with very poor sanitary and hygienic conditions, HAV infection is highly endemic and most persons become infected in early childhood [3]. Also result of this study suggest that 41 (22.8%) are negative for both hepatitis A antibodies IgG and IgM. This indicates the requirement of vaccination against hepatitis A virus. It is necessary because of the fact that, hepatitis A leads to severe complication as the children becomes older. It was found that the age of exposure to hepatitis A virus infection is increasing towards puberty worldwide. This may be due to the epidemiological changes of hepatitis A virus trend [7]. Similarly, hepatitis A virus is the most common detected cause of fulminant hepatitis among children in worldwide [1,8]. There is a need of government in Nigeria to make a policy that will ensure a good sanitation and hygienic condition of the general population. Also there is need of empowerment program that will reduce poverty. Also community should be provided with a clean water supply. Finally, general screening should be carry out and vaccination of people that are not immune to hepatitis A virus.

Acknowledgement

We thank to staff of Immunology Department University of Maiduguri Teaching Hospital and Staffs of Local

Government Education Authority Potiskum Local Government Area Yobe State. We are also indebted to the parents of the pupils for giving us necessary cooperation.

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