HEPATITIS B, C AND HIV SEROLOGICAL MARKERS IN CHILDREN WITH SICKLE CELL ANAEMIA IN A TERTIARY HOSPITAL, GUSAU, NORTH-WESTERN NIGERIA

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ABSTRACT

Background: Sickle Cell Anaemia patients are considered to be among the high-risk groups for hepatitis B and C viral infections. These viruses and HIV share common routes of transmission and similar risk factors and their infections coexist. **Objective**: This study was aimed at determining the seroprevalence of hepatitis B, C and HIV viral markers of infections in children with SCA. **Methodology**: A cross sectional Hospital based study conducted on 89 confirmed SCA Children aged 6 months – 13 years in steady state attending Haematology Clinic in a Specialist Hospital Gusau from July 2017 to March 2018. Approval for the study was obtained from the Research and Ethics Committee of the Hospital. The age, gender, history of blood transfusion, traditional scarification, uvulectomy, circumcision and immunization of the subjects were recorded. Serological test was carried out to determine the prevalence of hepatitis B, C and HIV using the viral markers and HIV 1& 2 rapid test kits. **Results**: Eighty-nine subjects were recruited with 46(51.7%) males and 43(48.3%) females. The mean age was 5.06 ±3.4 years. The seroprevalence of HBsAg, HBsAb, HBcAb, HBeAg, HBeAb, AntiHCV and HIV 1& 2 were 3(3.4%), 3(3.4%), 5(5.7%), 1(1.1%), 6(6.9%) and 0% respectively. No co-infection among the studied subjects. There is no significant difference in the age or gender distribution and seroprevalence of the viruses among SCA children. p = > 0.05 **Conclusion:** Hepatitis C infection is found to be high as opposed to Hepatitis B which is lower among SCA Children in this community.

Keywords: Hepatitis B, Hapatitis C, HIV, Sickle cell anaemia, Children.

INTRODUCTION

Viral hepatitis refers to a primary infection of the liver by a virus or viruses, resulting in hepatic necrosis.[1]Hepatitis B is a potentially life-threatening liver infection caused by the hepatitis B virus (HBV) and the most serious type of viral hepatitis.[2] Hepatitis B Virus infection remains a global public health problem and it is still high in areas of Western Africa and Asia.[2,3] Human Immunodeficiency Virus (HIV)/HBV or HIV/HCV coinfection has added to the complexity of managing children infected.[3] The increasing number of children with hepatitis C virus (HCV) infection presenting for treatment, the high HBV prevalence rate especially in Sub-Saharan Africa and coupled with poverty and ignorance will tend to increase the morbidity and mortality associated with these viral infections especially in children with Sickle cell anemia (SCA).[2,3,4]Hepatitis B, C and Human Immunodeficiency viruses share common routes of transmission and similar risk factors for infection. These viruses are considered to be endemic in Africa with highly variable infection rates among the African Countries.[4,5] The prevalence of HIV/HBV and HIV/HCV co-

infections among Nigerian children in Benin were reported to be 8.3% and 2.7% respectively.[6] Whereas co-infection with all the three viruses (HBV, HCV and HIV) of 0.2% was reported in only one child.[6] To the best of our knowledge, no similar study was carried out in this area.

Sickle cell anaemia (SCA) affects about 2% of Nigerians at birth and is the commonest genetic disorder in Nigeria.[7,8] It is an autosomal recessive disorder resulting in chronic and frequently life-threatening clinical conditions which include recurrent severe anaemia, as a feature of its anaemic crisis, and repeated infections commonly causing death in these children.[9] Viral hepatitis in SCA patients has been implicated as a possible cause of hepatic dysfunction and the distinction between SCA patients with hepatic crisis and those with viral hepatitis could be difficult. Sickle cell anaemia patients are prone to repeated blood transfusions, hence, they are considered to be among the high-risk groups for hepatitis B and C viral infections.[10] This therefore, places them (SCA patients) at maximum risk of getting infected, especially in developing nations where ignorance and poverty are common in addition to lack of proper organised blood transfusion services.

The laboratory testing for viral markers provide the best method of confirming the presence of viral hepatitis.[10] This study is imperative as it was aimed at determining the seroprevalence of hepatitis B, C and HIV infections [hepatitis B surface antigen (HBsAg), hepatitis B surface antibody(HBsAb), hepatitis B core antibody (HBcAb), hepatitis B envelop antigen (HBeAg), hepatitis B envelop antibody (HBeAb) antibodies to HCV (Anti-HCV) and HIV 1&2], Socio-demographic data as well as associated risk factors of the infections in SCA children.

MATERIALS AND METHOD

This study was an observational cross sectional Hospital-based study that was conducted at the Haematology clinic, department of Paediatrics of Ahmad Sani Yariman Bakura Specialist Hospital, (ASYBSH), Gusau, Zamfara state, North-Western Nigeria, between July 2017 and March 2018. Subjects that satisfied the inclusion criteria and their parents consented were consecutively recruited as they presented to the weekly haematology clinic over the study period. Approval for the study was obtained from the Research and Ethics Committee of the Hospital. Informed written consent was obtained from parents/care givers and clinical data recorded for each subject using questionnaires. Data obtained were age, gender of the subjects and history of blood transfusion, traditional scarification, circumcision, uvulectomy and tattooing. The socio-economic status (SES) of the parents was determined using Oyedeji classification.[11] Other clinical findings documented include jaundice, hepatomegaly, splenomegaly and evidence of traditional scarification marks, tattooing and circumcision.

The subjects aged 6 months – 13 years in steady state who were attending Haemalotogy clinic of ASYBSH Gusau had their blood samples collected into EDTA and plain bottles respectively. Blood samples in EDTA bottles were used to confirm the haemoglobin electrophoresis (HbSS) of the subjects using cellulose acetate media at alkaline pH. The blood samples in plain bottles were centrifuged within 2 hours of collection and the serum obtained was used to assay for HBsAg, HBsAb, HBcAb, HBeAg, HBeAb and Anti-HCV using Hepatitis B virus Rapid test (5 in 1) by Creative Diagnostics, Shirley, NY 11967, USA and Rapid Diagnostic Test kit for Anti-HCV by Nantong Egens Biotechnology Co. Ltd China. The HIV 1 & 2 tests were done using test kits from Trinity Biotech plc, IDA Business Park, Bray, Co.wick low, Ireland. The Manufacturer's instructions were strictly followed in carrying out the tests. Polymerase Chain Reaction (PCR) was used to determined HIV status of subjects <18 months. Statistical analysis was done using SPSS statistical version 20.0. Chi square and student t-test were used to assess the significant difference. A p-value of <0.05 was considered significant.

RESULTS

Eighty-nine HbSS subjects were enrolled into the study. Males were 46(51.7%) and 43(48.3%) were females. Male to female ratio; 1.1:1. The mean age (±SD) was 5.06 (± 3.4) years (range 0.5 to 13 years). Figure I.

Three (3.4%) of the subjects were positive for HBsAg, 3(3.4%) for HBsAb, 5(5.7%) for HBcAb, 1(1.1%) for HBeAg, and 6(6.9%) for HBeAb. There was no statistically significant difference in the gender distribution of the seroprevalence of hepatitis B (p-value = >0.05) as shown in Table 1. Nine (10.2%) of the SCA children were positive for Anti-HCV with 5(55.6%) being males and 4(44.4%) females. None of the patients was positive for HIV or Hepatitis B and C co-infection.

Children aged 1.0 – 4.9 and 5.0 – 9.9 years have the highest number of positive viral markers with 37% for each respectively, followed by 27% for children in the age group 10 – 13 years. The difference is not statistically significant (Table 2). Seventeen (63%) of the subjects with seropositive viral makers,9(33.3%) and 1(3.7%) were from middle, lower and upper SES respectively(p-value >0.05) as depicted in Table 3.

Out of 89 SCA patients that were recruited, 47(54%) had previous blood transfusion; 21[44.7%] had one previous blood transfusion and 26[55.3%] had2 or more blood transfusions. Four (4.5%) of the 89 SCA subjects had traditional scarification, 38(42.7%) had traditional uvulectomy and 41(46.1%) were vaccinated against Hepatitis B with 36(87.8%) of those vaccinated had complete vaccination and 5(12.2%) had incomplete vaccination. There was no correlation between the seropositivity of the viral marker(s) and the risk factors studied (blood transfusion, frequency of blood transfusions, traditional scarification and uvulectomy),p-value = 0.878.

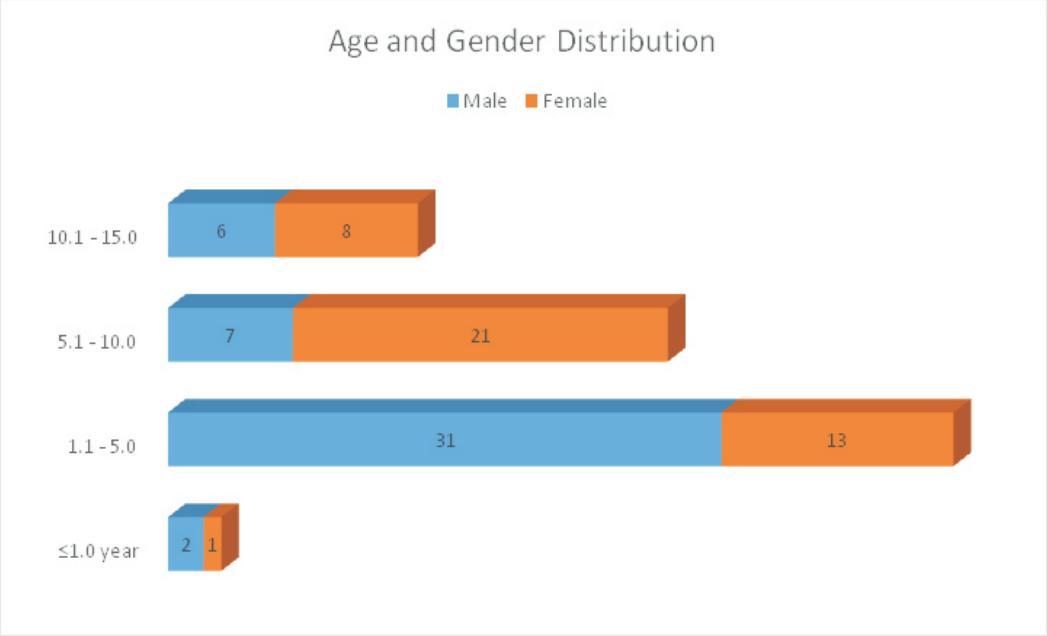

Figure 1: Age and gender distribution of the Subjects.

Table 1: Seropositive and Seroprevalence of Viral Markers

Viral Marker	Positive (%)	Negative (%)	Male (Positive)	Female (Positive)	Total (p-value)
HBsAg	3 (3.4)	86 (96.6)	0	3	3 (p-0.105)
HBsAb	3 (3.4)	86 (96.6)	3	0	3 (p-0.129)
HBcAb	5 (5.7)	84 (94.3)	4	1	5 (p-0.164)
HBeAg	1 (1.1)	87 (98.9)	0	1	1 (p-0.489)
HBeAb	6 (6.7)	83 (93.3)	4	2	6 (p-0.676)
AntiHCV	9 (10.2)	80 (89.8)	5	4	9 (p-0.559)
HIV	-	89	-	-	0

Table 2: Age-Specific Prevalence of Viral Markers

Age group(years)	HBsAg Positive	HBsAb Positive	HBcAb positive	HBeAg positive	HBeAb positive	AntiHCV Positive	Total (%)
<1	0	0	0	0	0	0	0
1-<5	1	2	3	0	3	1	10 (37)
5-<10	2	1	1	1	1	4	10 (37)
10-15	0	0	1	0	2	4	7 (26)
Total	3	3	5	1	6	9	27 (100)
P-value	0.495	0.430	0.621	0.511	0.490	0.041	

Table 3: Viral Markers and Socio-economic Status Ses

SES	HBsAg Positive	HBsAb Positive	HBcAb positive	HBeAg positive	HBeAb positive	AntiHCV Positive	Total (%)
Low	1	1	1	0	2	4	9 (33.3)
Middle	2	2	4	1	4	4	17 (63)
Upper	0	0	0	0	0	1	1 (3.7)
Total	3	3	5	1	6	9	27 (100)
p-value	0.718	0.712	0.305	0.511	0.540	1.000	

DISCUSSION

Hepatitis B infection is a global health problem and still highly endemic in large parts of Africa.[2,12] New cases occur every year despite availability of safe and effective vaccine.[12] Hepatitis B and C are more infectious than HIV.[12,13]The high-risk groups such as SCA are more prone to infection.

The low seroprevalence rate for HBsAg was in line with the low prevalence rates reported in similar Nigerian and Saudi studies.[4,14,15]The Nigerian studies, 2.4% recorded in adults sicklers in Ile-Ife[4] and 3.6% was in children with SCA in Port Harcourt[14] while 1% reported in SCA children in Saudi.[15]In another series, HBsAg prevalence rates in HIV infected children in Nigeria were higher 7.7% and 10% in Benin[16] and Ilorin[17] respectively. The low prevalence in this study may reflect mode of transmission and disease burden variability of viral hepatitis in the community. The prevalence rate for HBsAb in this study was much lower compared to 8.5% seen in adult sicklers.[4] The higher rate recorded in the adult SCA subjects may be as result of immunity from previous infection or exposure whereas the lower rate in this present study may be attributable to improved blood transfusion screening services.

The HBcAb depicts or suggests chronic infection of hepatitis B.[18]The HBcAb prevalence rate obtained in this study is consistent with the 5.2% recorded in Benin, Nigeria but in sharp contrast to 13.4% and 13.63% higher rates of HBcAb that were reported in Ile-Ife (Nigeria)and Al-Hafouf (Saudi) respectively.[4,16,19]The low rate of HBcAb recorded in this study may implies low rate of chronic hepatitis B infection in this community.

The detection of HBeAg in the blood indicates high infectivity or active infection in an individual with hepatitis B infection.[18] The HBeAg prevalence rate recorded in 2 previous studies was 0%,[4,19]compared to 1.1% in this study. Children in this study may have active infection which may explain the HBeAg seropositivity in them compared to seronegative HBeAg which indicate low infectivity in other studies. Hepatitis B envelope antibody, (HBeAb), seroprevalence rate recorded in this study is slightly lower in comparison with the 2 studies that reported 8.5% and 13.6% HBeAb prevalence rates in Ile-Ife and Saudi respectively.[4,19]The reason for the lower HBeAb rate in this study may reflect the percentage of our subjects that have had spontaneous seroconversion (HBeAg - HBeAb) without treatment as none of our patients had previous treatment.

High hepatitis C infection rate in our subjects is comparable to higher prevalence rates of 13.4% and 12.5%in SCA patients that were reported in Brazil and Iran respectively.[20,21]Other similar studies in

SCA subjects have reported lower prevalence rates of Anti-HCV ranges between 3.7% and 7.3%.[4,13,22,23]More lower prevalence rates of 1.7% - 5.2% were reported in HIV infected children.[16,17]Most of the studies done on the Hepatitis C infection in SCA patients have linked the prevalence rates of Anti-HCV to blood transfusion rates.[22,23] The high prevalence rate of Anti-HCV in this study did not correlates to blood transfusion or other risk factors studied. Lack of correlation of blood transfusion and high prevalence rate of Anti-HCV in our study may be explained by the standard blood transfusion screening services in the study area. However, the reason for high Anti-HCV rate may be as a result of vertical or perinatal transmission. Direct or indirect person-person households' contact may not be rule out. These unidentified factors will necessitates further research.

The HIV prevalence rate obtained in our study is similar to 0.0% prevalence rates that was reported among SCA subjects in Saudi and Senegalese studies.[15,24]These observations were in sharp contrast to other studies in which HIV prevalence rates among SCA patients were in the range of 1.8% - 2.9% respectively.[4,12,25,26]But our HIV prevalence rate may be a reflection of very low HIV transmission in children in this community which may also be connected with the very low HIV prevalence rate of 0.9% in this environment.[27]

CONCLUSION

Hepatitis C infection is found to be high as opposed to Hepatitis B which is lower among SCA Children in this community. Therefore, there is the need to strengthen the preventive measures particularly for Hepatitis C which presently has no available vaccine.

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