Hepatitis B Surface Antigenemia Among Transfused Children with Sickle Cell Anaemia in Enugu Nigeria.

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SUMMARY

Background: Hepatitis B virus (HBV) is a major public health problem in the world with high endemicity in Nigeria. It is contracted through contact with the body fluid of an infected person. Patients with sickle cell anaemia (SCA), a common haematological disorder in Nigeria, may have complications that require blood transfusion, thus exposing them to the risk.

Objective: To determine the prevalence of hepatitis B surface antigen (HBsAg) among transfused children with SCA in Enugu.

Subjects and Method: One hundred and thirty transfused children aged 6months to 17years with SCA were recruited consecutively from October 2004 to April 2005 while 91 non transfused children with SCA aged 7months to 17years were recruited over the same period served as controls. Both groups were screened for HBsAg using ELISA method.

Results: There was no statistically difference in the HBsAg positivity among transfused (8.5%) when compared to non transfused (7.7%) (p=0.837). The difference between those who received their blood from paid donors (8.7%) and those from voluntary (8.2%) was also not statistically significant (p=0.753).

Conclusion: The high prevalence of HBsAg among children with SCA in Enugu may not be related to blood transfusion.

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Key words: **Hepatitis B virus, Sickle cell anaemia, Blood transfusion**

INTRODUCTION

Hepatitis B Virus (HBV) infection is a major disease of mankind and a serious public health problem world wide.[1] It is more prevalent in the developing countries as available human and material resources were effectively applied to control the spread of HBV in the developed countries .[2] Nigeria is located within the hyper endemic area for HBV.[3] Presence of Hepatitis B Surface antigen (HBsAg) in the blood indicates an infection with HBV.[4]

World wide, it is estimated that there are 350 million chronic carrier of HBV.[1] About a quarter of these carriers develop serious liver diseases like chronic hepatitis, cirrhosis and primary liver cell carcinoma.[1,5] Sickle cell anaemia is a common haematological disorder in Nigeria.[6] It is a genetically determined condition in which there is substitution of valine for glutamic acid at position 6 of the beta chain of the haemoglobin molecule.[7] This leads to formation of haemoglobin S (HbS) which in low oxygen tension form tectoids which distorts the red blood cell to sickle shape.[7,8] People who are homozygous for HbS are said to have sickle cell anaemia (SCA) and they manifest the disease. There is reduction in the life span of red blood cell to less than 25 days due to their premature destruction in the reticuloendothelial system.[9] The sickled red blood cells block the microcirculation leading to ischaemia and sometimes tissue infarction. Other complications like aplastic,sequestration and hyperhaemolytic crises, lead to a decrease in haematologic levels and a need for blood transfusion.[8]

Infection with HBV occurs when an infected blood or body fluid enters the body of a person who is not immune.[10] After exposure to HBV, the clinical manifestations begin 6weeks to 6months depending on the patient's immune response. HBsAg begin to appear 1 month after exposure to HBV and if it persist beyond 6months, indicates chronic HBV infection.

About 10 years ago it was reported that many hospitals and clinics transfused unscreened blood.[11] In Nigeria, Saudi Arabia and Italy, children with haematological disorders like sickle cell disease (SCD), Beta thalasemia, idiopathic refractory anaemia and haemophilia were reported to have high HBsAg prevalence due to high frequency of blood transfusion among other factors.[12,13,14]

WHO estimates that 30% of blood collected for transfusion in the developing countries is not screened for HBsAg.[15] It also reported that in highly endemic areas, the probability of post transfusion HBV infection as a result of a single unit transfusion is 5% in children.[15]

Studies in Nigeria have given conflicting results on the effect of blood transfusion on HBsAg prevalence. Studies in Jos,[16] north-central Nigeria and Enugu,[17,18] south-east Nigeria show no incresae while those in Lagos[19], south-west Nigeria and Benin [20] south-south Nigeria showed that blood transfusion is an important risk factor. El Hazmi and co worker [13] in Riyadh, Saudi Arabia also found higher prevalence of HBsAg among children with SCD which they attributed to blood transfusion.

These facts prompted us to conduct a cross-sectional study involving transfused children with SCA in Enugu, Nigeria to determine the prevalence of HBsAg among them and to assess the current status.

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SUBJECTS AND METHODS

The study was carried out at the University of Nigeria Teaching Hospital (UNTH) Enugu, Nigeria. The hospital has a well established and widely patronized sickle cell clinic that serves 5 states in the south-east Nigeria.

One hundred and thirty children aged (6 months to 17years) with SCA attending the sickle cell clinic were recruited consecutively from October 2004 to April 2005 for the study while 91 non transfused age and sex matched children with SCA (aged 7months to 17years) were recruited as controls. The age of the subjects at last birthday or full completed months in case of infants were taken as their age in this study. The subjects were transfused at least 6months before recruitment for the study.

Their haemoglobin phenotypes had been determined previously by haemoglobin electrophoresis on cellulose acetate paper at PH of 8.4 in the haematology department of UNTH Enugu. A pretested questionnaire was used to obtain information on age, sex, history of blood transfusion.

Ethical clearance was obtained from UNTH ethical committee. Informed written consent was obtained from parents and caregivers.

Five milliliter of venous blood was collected from each subject after a verbal consent. The blood was transported to the laboratory where the serum was separated and stored at minus 20 degree centigrade till assayed for HBsAg by ELISA method using Monolisa Diagnostic Kit, Tokyo Japan.

Statistical analysis was done using SPSS statistical package. The chi-square test was used to asses the significance of the difference among the groups. A P–value of < 0.05 was considered significant.

RESULTS

A total of 130 children who received blood transfusion were tested for HBsAg. Their age ranged from 6 months to 17 years (mean 9.9 + 4.4) and male: female ratio was 1.1: 1. Ninety one children with SCA who did not receive blood transfusion served as controls. Their age ranged from 7months to 17 years (mean 9.7 + 4.6) and male: female ratio 1:1.1.

Among the subjects, 11 were positive for HBsAg giving a prevalence rate of 8.5% while 7 out of 91 non transfused children that served as control were positive giving a prevalence rate of 7.7%.(P = 0.837; Table 1).

Five out of 61 subjects that received blood from voluntary, non remunerated donors were positive for HBsAg giving prevalence rate of 8.2% while 6 out of 69 subjects who received blood from paid donors were positive giving a HBsAg prevalence rate of 8.7% (P = 0.753).

Frequency of blood transfusion ranged from 1-6 times but this did not significantly influence Hepatitis B surface antigenaemia among the subjects (P = 0.894) . Whether blood was transfused at government owned hospitals or those owned by private/voluntary agencies it did not influence the prevalence of HBsAg (P = 0.9).

Table 1: Seropositivity of HBsAg in transfused and non transfused children with SCA

	No Studied	n (%) Positive for HbsAg
Transfused	130	11(8.5)
Non Transfused	91	7(7.7)
Total	221	18

P= 0.837

Table 2: Frequency of blood transfusion and HBsAg

No of Transfusions	No of subject	n (%) Positive for HBsAg
1-2	43	4(9.3)
3-4	56	4(7.1)
5-6	31	3(9.7)
Total	130	11

P= 0.894

DISCUSSION

The HBsAg prevalence rate of 7.7% and 8.5% in non transfused and transfused children respectively with SCA in Enugu was higher than 0.5% among children with SCD in USA.[21] Prevailing circumstances in that country like low endemicity, efficient preventive measures and highly developed and efficient medicare may be responsible. It is also higher than 6.5% prevalence in children with SCA reported in the same locality by Kaine et al.[17] in 1981. This is probably due to use of less sensitive haemaglutination test in that study.

The findings in this study compares favourably to the findings by Agumadu and Abiodun [18] who found HBsAg prevalence rate of 7% in children with SCA in Enugu using ELISA method 10 years ago showing that not much change has occurred.

The value reported in this work is lower than the values from other parts of Nigeria; Benin, South-South (39.2%)[12], Jos ,North-Central (23%)[16], Ibadan, South-West (15%)[2] among children with SCD. The reason for this is not obvious but it observed that most studies in Eastern Nigeria both in normal and children with SCA showed prevalence below 10%.[17,18] It could not be ascertained whether screening blood for HBsAg before transfusion first started in this part of Nigeria. However the people of this area share common ethno-socio-cultural similarities distinct from other parts of Nigeria. This may be responsible for the common but yet to be identified local epidemiological circumstances that may be responsible for the lower HBsAg prevalence.

The prevalence value of HBsAg of above 7% in this study falls within high endemic area as described by CDC,[3] This large pool of infected children who can easily transmit the infection to others make it a major public health problem in Enugu.

The lack of significant difference in the prevalence of HBsAg between the transfused and non transfused children with SCA in this study is similar to findings by other workers in Jos[16] north-central and Enugu south-easth, Nigeria.[17] Also

Ndumbe et al[22] in Yaoundé, Cameroun in their study of general population found that blood transfusion did not increase the prevalence of HBsAg as observed in this study. All the blood transfusions in this study were screened for HBsAg but the quality of reagents could not be ascertained.

Transmission of HBV through blood transfusion has been established in the literature. El Hazmi and co worker [13] in Riyadh, Saudi Arabia also found higher prevalence of HBsAg among children with SCD and thalasaemia, they concluded that even the most sensitive third generation screening techniques cannot completely guarantee HBV free blood. This concurred with facts documented by Brummechuis et al,[23] that 2 out of 1000 units of screened plasma donations negative for HBsAg using very sensitive test are still infectious. These studies showed that blood transfusion is a definite risk factor for HBV transmission, the reason for contrasting finding in the current study is not obvious. It may be that in hyper endemic area, most susceptible children either have an established infection or are immune from previous infection.

It was reported by Brummechuis et al[23] that even when all blood are screened for HBsAg, donations from volunteered non remunerated donors have been proved safest. In this study however the risk of HBV transmission is similar in both paid and non remunerated groups.

In this study the frequency of blood transfusions bear no relationship with the prevalence of HBsAg. Other workers in Nigeria and elsewhere have reported similar findings .[16,17,,22] The reasons for this is not clear considering the high prevalence of HBsAg among adult population in Nigeria who constitute the blood donors.[11,20] However these findings contrast with that of Multimer et al [20]in Benin, Nigeria who noted that HBV infection increased with increasing number of units of blood transfused.

WHO had earlier reported that about 30% of blood for transfusion in the developing countries is not screened for HBsAg.[15] Chikwen et al[11] also reported that most hospitals and clinics in Nigeria transfuse unscreened blood, but they did not categorized the offenders. This study grouped the health facilities into two, those owned by the government and those owned by individuals/ voluntary agencies. However the place of treatment in this study did not seem to have any effect on the prevalence HBsAg among the children.

In conclusion blood transfusion does not seem to be a significant risk factor in the transmission of HBV infection among children with SCA in Enugu.

There is urgent need to intensify the campaign on childhood immunization against HBV to reduce its endemicity in Nigeria in general and Enugu in particular.

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