Nigerian Journal of Clinical Practice
December 2009 Vol. 12(4):355-358

THE ROLE OF BLOOD TRANSFUSION ON THE PREVALENCE OF HEPATITIS C VIRUS ANTIBODIES IN CHILDREN WITH SICKLE CELL ANAEMIA IN ENUGU, SOUTH EAST NIGERIA

OS Ejiofor, **BC Ibe, **IJ Emodi, **AN Ikefuna, **GC Ilechukwu,G Emechebe, **C Ilechukwu**
*Department of Paediatrics, *Amaku General Hospital Awka, Anambra State, **University of Nigeria Teaching Hospital Enugu, Enugu State,***Imo State University Teaching Hospital Orlu, Imo State,Nigeria.*

ABSTRACT

Background: The hepatitis C Virus (HCV) has become an important cause of chronic liver disease and liver cancer worldwide. Blood transfusion is one of the important modes of transmission. There is need to study the prevalence among those at risk such as sickle cell anaemia (SCA) patients. Such information will broaden knowledge of the problem among SCA patients transfused with blood in this part of the country.

Objective: To determine the prevalence of HCV antibodies among children with SCA transfused with blood in Enugu, compared with their non transfused counterparts as well as the roles of blood transfusion and traditional surgery in the prevalence of HCV infection.

Methodology: The study was conducted among 269 children with SCA attending the paediatrics sickle cell clinic at University of Nigeria Teaching Hospital (UNTH) Enugu, with 136 transfused SCA patients as subjects and 133 age and sex matched non-transfused SCA who served as controls.

Results: The results showed an HCV antibody prevalence of 6.6% among the transfused and 5.3% among the non-transfused (controls) SCA patients (P=0.610). There was positive association between number of transfusions and HCV seropositiviy, such that those who had received 4 or more units of blood had a prevalence rate of more than 50% (P = 0.001). The influence of scarifications on the prevalence of antibodies to HCV (antiHCV) for the non transfused (controls) was statistically significant (P = 0.001).

Conclusion: HCV infection is not uncommon in children with SCA. The prevalence of HCV infection in transfused SCA patients is not significantly higher than their age/sex matched controls.

Key Words: Blood transfusion, Hepatitis C, Sickle cell anaemia. *(Accepted 11 August 2008)*

INTRODUCTION

Hepatitis C virus (HCV) has become an important cause of chronic liver disease and liver cell cancer world wide[1]. It has world wide prevalence of 3.1% with Africa recording the highest prevalence of 5.3% [2]. It is estimated that about 170 million people world wide are chronically infected with HCV and majority are in the developing countries[2]. HCV has been found to lead to chronicity in 70 - 85% of cases. About 30% of those infected will progress to liver cirrhosis and ultimately to end stage liver failure and hepatic carcinoma[1]. The mode of transmission of the virus is mainly parenteral. Some risk factors associated with HCV infections are transfusion of blood or blood products, tattooing /scarification with re-use of instruments, body piercing, injection/illict drug use, multiple homosexual and heterosexual partners as well as perinatal exposure to infected body fluids[2]. Sickle Cell anaemia (SCA) is a common cause of morbidity and mortality in Nigeria with a prevalence rate of 1.6 3%[3]. It is a genetic disorder with life long complications. The natural course of SCA involves series of thrombotic crises with therapeutic interventions within and outside hospital settings. Common medical interventions for SCA patients in Nigeria include blood transfusion, injections (often by unqualified persons), scarifications, tattooing and ritual marks by herbalists. These predispose them to risk of HCV infection. Some studies have suggested that blood transfusion increases the risk of HCV infection in patients with SCA[4,5]. De Vault[4] assayed 121 consecutive SCA patients in the United States of America (USA) for HCV antibodies and found 25 (20.7%) to be anti-HCV positive. This suggests a relatively high prevalence of HCV infection in SCA patients in the USA. Few local studies exist in Nigeria on HCV. To our knowledge, no study has been done in children with SCA in the South Eastern part of

Correspondence: Dr O S Ejiofor
E-Mail: smejiofor@yahoo.com

Nigeria. This study was undertaken to look at HCV in SCA patients. Information from this study may give a clearer picture of the burden of HCV amongst children with SCA in South Eastern Nigeria. It is hoped that information from this work may influence blood banking policies and form a basis for health education of communities. Finally the results of the study will advance knowledge on HCV infection in Nigeria SCA patients and may form a basis for future research.

MATERIALS AND METHOD

This study was done at University Nigeria Teaching Hospital (UNTH) Enugu, which is a referral tertiary health institution and serves mainly the South Eastern States of Nigeria. It is a 700 - bed capacity hospital. It runs two well established sickle cell clinics which cater for paediatric and adult patients respectively. Approval was obtained from UNTH ethical committee before commencement of this study. Informed written consent was obtained from each parent/guardian and the older children were applicable. Questionnaires were used to collect data on age and sex of subjects, occupation and educational level of the parents, risk factors for HCV infection like blood transfusion and traditional surgery (tattooing, scarification or ritual marks). The social class was determined using classification of social class proposed by Oyedeji [6]. The subjects were SCA patients, who had been transfused with blood. SCA patients, who had not been transfused with blood, and matched for age and sex served as controls.

The inclusion criteria were:

(a) SCA patients aged 1 to 18 years (completed age) with genotype confirmed by Hemoglobin electrophoresis.

(b) Patients who were transfused at least 3 months before collection of blood sample

After informed consent, patients (subjects and controls) were recruited consecutively from the sickle clinic of UNTH from February to September 2005. Blood samples were obtained under aseptic condition for HCV antibody assay. The blood samples were centrifuged within 3 hours of collection and the serum obtained was immediately assayed for HCV antibodies with new (Second) generation HCV one step hepatitis C Virus test strip (serum / Plasma from Acumen diagnostic Inc. USA) which is a rapid chromatographic enzyme immuno assay for the qualitative detection of antibody to hepatitis C virus in serum or plasma[7]. The sensitivity of the test strip is > 99%, while its specificity is 98.6%[7]. Parents and guardians whose children tested positive were counseled on the nature of HCV infection and the need for follow up.

Data Analysis

Data analysis was done with statistical package for social science (SPSS) version 11.5 software. A P-value of < 0.05 was considered statistically significant.

RESULTS

Of a total of 328 questionnaire forms distributed, 301 responded giving a response rate of 91.8%.The other 27 declined consent. Of the 301 that responded, 4 could not be matched for age and sex. Nineteen questionnaires were rejected due to incomplete data and 9 patients declined blood letting. Ultimately 269 children with SCA aged 1 to 18 years were studied made up of 136 subjects and 133 controls. The mean age for the subjects and controls were 10.19 5.31 years and 10.11 3.11 years respectively.

Table 1 shows the age group of the study population. Majority of the study population were between 13 18 years accounting for 36.8% of the subjects and 37.6% of controls.

Table 2 depicts social class of the subjects and controls. Majority of the subjects and controls were in lower socio economic groups (class IV V). This comprised of 60.29% of the subject and 60.9% of the controls. There were 30.15% of the subjects and 27.8% of controls in social class III, while 9.56% of subjects and 11.3% of controls respectively were in high social class (class I II). The socio economic spread of subjects compared to the controls showed no statistically significant difference P= 0.810.

Table 3 compares the distribution of Anti-HCV seropositivity in subjects and controls. Out of 136 subjects, 9 tested positive, giving a prevalence rate of 6.6%. In the control population, 7 out of 133 tested positive, giving a prevalence rate of 5.3%. The difference in prevalence rates of the subjects compared to the controls was not statistically significant, P= 0.610.

Table 4 shows the frequency of blood transfusion in relation to HCV seropositivity among the subjects. The number of blood transfusions ranged from 1 8 units with a mean of 1.95 ± 1.44 per subject. Among those that tested positive, the highest rate was recorded in those that received 4 or more units of blood transfusions. This may suggest that the chances of being positive increases with increasing units of blood transfusion. When different units of blood transfusion were compared the difference was statistically significant P = 0.001.

Table 5 highlights the effect of scarification on anti HCV seropostitivity among the subjects and controls. Among the 37 SCA subjects that had scarification, 4 (10.8%) tested positive. While out of 99 without scarification, 5(5.1%) tested positive. When those with and without scarification were compared the difference was not statistically significant P>0.05.

However among the control population, 31 patients had scarifications, out of which 7 (22.6%) tested positive. while out of the 102 without scarification none (0%) tested positive. When those with and without scarification in the controls were compared, the difference was statistically significant P = 0.001. The scarifications were all done by traditional healers and tattoing is not common as none of the respondents had it.

Table 1**: Age Group of the Subjects and Controls.**

Age group (Years)	Total No	(%)	Subjects No	(%)	Controls No	(%)
1 - 6	76	(28.25)	39	(28.69)	37	(27.82)
7 - 12	93	(34.57)	47	(34.51)	46	(34.59)
3 - 18	100	(37.18)	50	(36.80)	50	(37.59)
Total	269	(100.00)	136	(100.00)	133	(100.00)

P> 0.05

Table 2: **Social Class of the Subjects and Controls.**

Social Class		Total No	(%)	Subjects No	(%)	Controls No	(%)
Upper	I	8	(2.97)	4	(2.94)	4	(3.0)
	II	20	(7.44)	9	(6.62)	11	(8.3)
Middle	III	78	(29.00)	41	(30.15)	37	(27.8)
Lower	IV	127	(47.21)	65	(47.79)	62	(46.6)
	V	36	(13.38)	17	(12.50)	19	(14.3)
Total		269	(100.00)	136	(100.00)	133	(100.00)

P = 0.810

Table 3: **Prevalence of Anti-HCV Antibodies in Subjects and Controls.**

Group	Total No	(%)	No Positive	(%) Prevalence	No Negative	(%)
Subjects	136	(100)	9	(6.6)	127	(93.4)
Controls	133	(100)	7	(5.3)	126	(94.7)

$X^2 = 0.22$ P = 0.610

Table 4: **Frequency Distribution of Blood Transfusion in Relation to Anti HCV Seropositivity among Subjects.**

Units of Blood Transfusion	Total No	(%)	Positive No	(%)	Negative No	(%)
1	76	(55.9)	4	(44.4)	72	(56.7)
2-3	45	(33.1)	0		45	(35.4)
≥ 4	15	(11.0)	5	(55.6)	10	(7.9)
	136		9		127	

$X^2 = 20.51$ P = 0.001

Statistically significant

DISCUSSION

This study showed a prevalence rate of 6.6% of HCV antibodies among blood transfused children with SCA in Enugu. The control group showed prevalence of 5.3% though, the difference was not statistically significant, (P = 0.610). A prevalence rate of 6.6% of HCV antibodies is within the range of 5 10% reported from Lagos (5%)[8], Ilorin (5%)[9] and USA (10%)[5] in transfused patients with SCA. However, this rate is lower than the value reported from Benin[10] (20% prevalence rate). The high figure in the Benin study was explained by the cross reactivity with Eschericha coli[10] and also the fact that first generation kits were used. The prevalence rates of transfused and non transfused SCA patients in this study are very close. This may not be surprising, considering that the prevalence in the general population is 8%,[11], which is higher than the values obtained from this study. This may suggest that there may be other important routes of transmission apart from blood transfusion.

There was a statistically significant trend between the prevalence of anti-HCV antibodies and increasing number of blood transfusion among transfused SCA patients. This is similar to the trend observed in Benin[10], Lagos[8]. Similar trend was also observed in America [4,5,12]. However, the magnitude of the increase appears to be higher in this study as more than 50% of those who received 4 or more units of blood in this study were anti-HCV positive. This is comparatively higher than those that received more than 10units of blood in all American studies reviewed with seropositivity of 30%,[4] 23% [5] and 26.4% [12]. This is not surprising considering that blood is not routinely screened for HCV antibodies. It is therefore important that blood be given only when necessary and transfused blood be screened for HCV antibodies. Scarifications did not significantly increase the risk of acquiring HCV infection in the subjects. This is because 5 of the 9 children that tested positive for anti-HCV had no history of scarification or ritual marks as against 4 that had history of scarification and ritual marks, even though the difference was not statistically significant. This agrees with finding in Lagos[8] where there is not significant difference between those that had and those that had no traditional surgery. For the control group,

Table 5: **Effect of Scarifications on Subjects and Controls with Anti-HCV Seropositivity**

	Subjects			Controls		
Scarifications	Total	No Positive	No Negative	Total	No Positive	No Negative
Yes	37	4(10.8%)	33(89.2%)	31	7(22.6%)	24(77.4%)
No	99	5(5.1%)	94(94.9%)	102	0(0%)	102(100%)
Total	136	9	127	133	7	126

Subjects $X^2 = 1.45$ P = 0.230

Controls $X^2 = 24.99$ P = 0.001*

* = Statistically significant (P < 0.05)

scarifications significantly influenced the risk of acquisition of HCV infection. Of the 31 controls that had scarification, all were done by traditional healers. Since this control group was not transfused, it is possible that they may have been infected through this scarifications. The positive HCV antibody seen in this non transfused sicklers may confirm the view that this infection can be acquired via other routes.

CONCLUSION

1. HCV infection is not uncommon in sickle cell anaemia patients.
2. The prevalence of HCV infection in transfused SCA patients is not significantly higher than their age/sex matched controls.
3. Blood transfusion does not appear to be the only route of HCV infection in SCA patients in Enugu, as there are other yet to be fully defined risk factors such as scarification marks and other traditional surgical practices.

ACKNOWLEDGEMENT

The authors are grateful to the patients who participated in this study for their patience and understanding just to make this study a success. We are also grateful to the members of staff of Chemical Pathology Laboratory, UNTH Enugu for their cooperation.

REFERENCES

1. **Hoofnagle JH. Hepatitis C.** The Clinical Spectrum of disease. Hepatology 1997; 26 : 15s 20s.

2. World Health Organization. Hepatitis C WHO Fact sheet No, 164. Available at http://www.who.int/inffs/en/fact164 html. Accessed April 2004.

3. **Akinyanju OA** A profile of Sickle cell disease in Nigeria. Ann Ny Acad Sci 1989; 565: 126-36

4. **De Vault KR, Friedman LS, Westerberg S, Martin P, Hossein B, Ballas SK.** Hepatitis C in sickle cell anaemia. J Clin Gastroentrol 1994; 18: 206-9

5. **Hassan MF, Marsh F, Posner G, Bellevue R, Dasik H, Suatengco R, et al**. Chronic Hepatitis C in patients with sickle cell Disease. Am J Gastroenterol 1996; 91(6): 1204-6

6. **Oyedeji GA**. Socio-economic and cultural Background of Hospitalized children in Ilesha. Nig J Paediatr 1985; 12: 111-17

7. **Wilber JC.** Development and use of laboratory tests for hepatitis C Infection: A review J. Clin. Immunoassay 1993; 16:204.

8. **Lesi OA, Kehinde MO**. Hepatitis C Virus infection in patients with sickle cell anaemia at Lagos University Teaching Hospital. Nig Postgrad. Med J 2003; 10: 79-83

9. **Adewuyi JO.** Prevalence of Antibodies to Hepatitis C Virus among Normal Blood Donors and Multi-transfused sickle cell anaemic patients in Nigeria. Tropical Doctor 1996; 26: 29-30

10. **Mutimer DJ, Olomu A, Skidmore N, Olomu D, Ratcliffe B, Rodgers HP, et al.** Viral Hepatitis in Nigeria Sickle Cell Disease and Commercial Blood Donors. Quart J Med. 1994; 87: 407-11

11. **Oni AO, Harrison TJ**. Genotypes of Hepatitis C Virus in Nigeria. J Med. Virol 1996: 49: 178-86

12. **Billet HH, Richard S.** Liver Function Tests in sickle cell Disease. Clin Lab Haem 2002; 24:21-27.