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Hepatitis C Virus and Human Immunodeficiency Virus-I (HIV) Co-Infection in Children in Benin City, Nigeria.

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ABSTRACT: The study was done to assess the incidence of Hepatitis C virus (HCV) infection and co — infection with Human Immunodeficiency virus - 1 (HIV) amongst children between the ages of 0 — 17 years in Benin City, Nigeria. Blood samples were collected from four hundred (400) children selected from public and private hospitals as well as primary and secondary schools in Benin City. Samples were analyzed for HCV using the One step Hepatitis C virus strip. HIV analysis was done using HIV rapid testing algorithm. Two hundred (200) out of the four hundred (400) children were randomly screened for Hepatitis B virus (HBV) infection using the Clinotech diagnostic HBsAg detection test. Questionnaires were used to obtain information about the children. Of all the children, only one child tested positive to HCV infection, giving a prevalence rate of 0.25%. All screening for HBV was negative. The child with HCV (a female) also tested positive for HIV, suggestive of a co — infection. There was no obvious influence of previous blood transfusion, exposure to intramuscular injections, place of delivery or educational status of the children's parents on the results obtained.

KEY WORDS: Hepatitis C virus, HIV, Children.

INTRODUCTION

Hepatitis C virus (HCV) is a major public health problem and a leading cause of chronic liver disease (Strader *et al*, 2004). The prevalence of HCV infection is increasing worldwide (Dhawan, 2004). The World Health Organization (WHO) estimates that more than 170 million individuals are infected with HCV. Our knowledge of hepatitis C virus (HCV) infection in children is limited, compared to adults. It is however known that the prevalence of HCV in children is between 0.05% and 0.4% and the major mode of transmission has shifted from parenteral transmission to maternal — infant transmission (Schwimmer and Balistreri, 2000).

HCV was identified in 1989 and unlike other types of viral hepatitis, HCV is very difficult for the immune system to overcome. As a result, most HCV infections (80 - 90%) become chronic and lead to liver disease, cirrhosis and liver failure (Zakin and Boyer, 1982). Although it may take up to 20 years or more to develop cirrhosis after HCV infection, it is still not clear which patient will progress in this way (Thursz *et*

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al, 1995). HCV has frequent mutation and several genotypes which makes it difficult to develop a vaccine against it. (Enamoto and Sato, 1995). Transmission of HCV was mainly via infected blood products, prior to HCV testing. In 1990, the risk was 8 — 10% but currently in developed countries with sensitivity testing, the risk has reduced to 0.001% per unit transfused (Screiber *et al*, 1996). Persons should be tested if they received a blood or blood component transfusion or organ transplant before 1992, when sensitive tests were first used to screen donors for HCV antibodies. Since that time, HCV infection is rarely transmitted by transfusion (Screiber *et al*, 1996). Other potential sources of HCV transmission include exposure to an infected sexual partner or multiple sexual partners, frequent exposure to infected blood among health care workers and perinatal exposure (Jonas, 2002). It is also advisable to test persons for HCV infection if they have evidence of otherwise unexplained elevations of aminotransferase levels (alanine and/or aspartate aminotransferase), have been on hemodialysis, or have human immunodeficiency virus (HIV) infection (MMWR Recomm Rep, 1998). Approximately 25% of HIV — infected persons in the western world have chronic hepatitis C (Sherman *et al*, 2002). Since the advent of effective antiretroviral treatments in 1996, liver disease has become an increasingly known cause of morbidity and mortality among HIV — infected persons (Monga *et al*, 2001). In children, HCV infection is primarily via transfusion of blood and blood products or by vertical transmission from their chronically infected mothers. Children at risk for HCV infection include those born to HCV — infected mothers and those who received blood or blood products prior to 1992. About 5% of children born to HCV - infected mothers in a study were found to be positive while 14% were positive from mothers with HCV and HIV infections (Ruudot-Thoraval *et al*, 1993). The rate of spontaneous viral clearance varies by age at acquisition, and generally occurs within the first year after acute infection. At present, new HCV infections in children are primarily the result of vertical (perinatal) transmission (Bortolotti *et al*, 1998). There are a number of differences in HCV infection between children and adults. Children are less likely to have symptoms, more likely to have spontaneous viral clearance, more likely to have normal or near — normal aminotransferase values, and have a slower rate of advancement to end stage liver disease (Jonas *et al*, 1998). It is noteworthy that in spite of all these various characteristics of HCV, information on its prevalence rate especially in children, in Nigeria, appears to be scanty and awareness for the prevention of the disease is low. This prompted the current study. The study was therefore aimed at getting the current prevalence rate of HCV in children in Benin City, Nigeria.

MATERIALS AND METHODS

Questionnaires were used to obtain information about the children. The information was analysed and the findings are presented. A total of 400 blood samples were collected randomly from children after obtaining informed consent, at the blood collection centre, University of Benin Teaching Hospital (UBTH) Children Emergency Clinic, UBTH; Health Centre, University of Benin; Central Hospital, Benin City; Some private hospitals and Primary / Secondary schools in Benin City.

5mls of blood was collected into plain bottles. This was followed by centrifugation and serum extraction. The serum was tested for HCV using the one step HCV test strip (Acumen Diagnostic, USA). This is a rapid chromatographic immunoassay for the qualitative detection of antibody to HCV in serum or plasma. The results were read at 10 minutes. Hepatitis B infection was tested using Clinotech diagnostic HBsAg detection test. This is a rapid direct binding procedure which visually determines hepatitis B surface antigen (HBsAg) in serum. HIV testing was done using the HIV rapid testing algorithm (Cheesbrough, 2000). Where sample was positive for the virus, confirmation was done using Abbott determine method. This test is intended as an aid to detect antibodies to HIV-1 / HIV-2 from infected individuals

RESULTS

Figure 1 is a histogram showing the age distribution of the children studied. There was a gradual increase in the number of children selected as age increased. Figure 2 shows the gender distribution of the children studied. Of the 400 children, a total of 166 were males. This represents 41.5 % of the entire sample population, while 234 (58.5%) were females. Figure 3 shows the result of the HCV antibody investigation within the study population. Of the 400 children sampled only one child tested positive for HCV antibody, suggesting a prevalence rate of 0.25% within the study population.

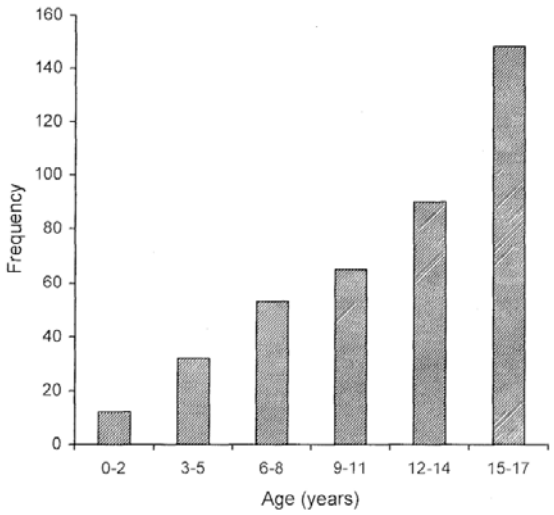

Fig. 1:
Age Frequency Distribution of the study population.

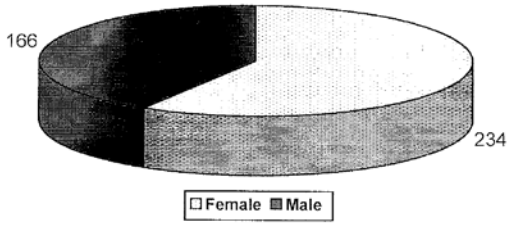

Fig. 2:
Gender distribution of the study population.

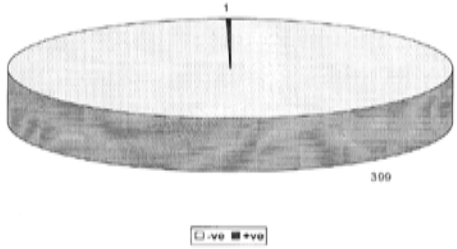

Fig.3
Hepatitis C- virus (HCV) Antibody Distribution

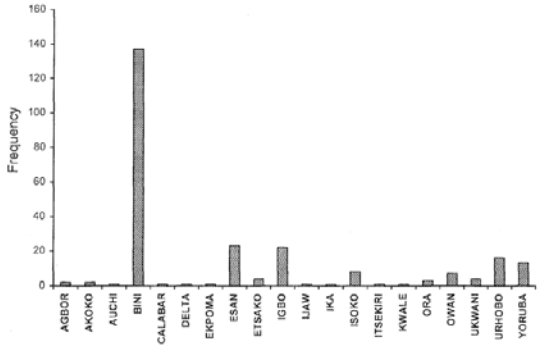

Fig. 4:
Tribes represented within the study population and their distribution

249 questionnaires were duly completed and returned out of the 400 given out. These were studied and the findings presented in figures 4 to 10. Figure 4 shows the tribe distribution as contained in the questionnaire given to the children sampled. The results show that about 20 tribes were sampled. The Binis were the highest in number with 137 children, representing 34.3% of the entire population.

Figure 5 shows the religions of the children studied. 244 representing 61.0% of the population studied were Christians, while 5 (1.3%) were moslems. Figure 6 shows the educational background of the children used for study. 209 (52.3%) children had educated parents and 40 (10%) of them had uneducated parents. Figure 7 shows the place of delivery of the children used for the study. The figure shows that 215 (53.7%) children were born in hospitals, 33 (8.3%) were born at home,

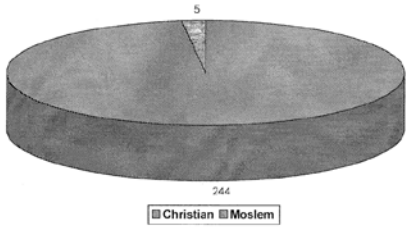

Fig. 5:
Religions of children within the study population

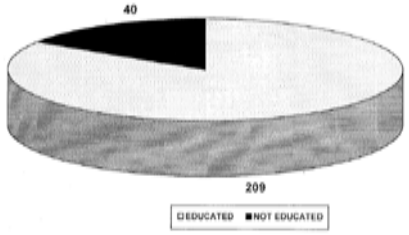

Fig. 6: Educational status of the Children's parents

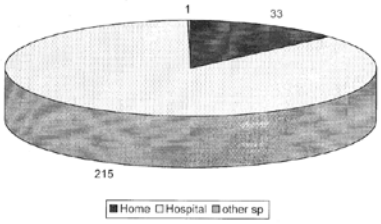

Fig. 7: Place of delivery of the children in the study

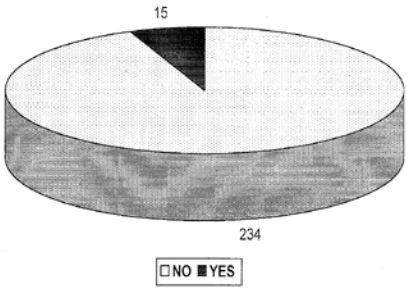

Fig. 8: Mother's history of Blood transfusion

while 1 (0.25%) was born outside (i.e. not in the hospital and not inside the house). Figure 8 shows whether the mothers of the children had been transfused or not. The mothers of 15 children had blood transfusion in the past, while the mothers of 234 had no blood transfusion. Figure 9 shows whether the children had blood transfusion or not. 20 chi1lren had had blood transfusion, while 229 children had never been transfused with blood. Figure 10 shows the hepatitis B immunization status of the children studied. Only 69 children had immunization against hepatitis B virus. Figure 11 shows the number of children who had/had not received intramuscular injection in the past. While 38 (9.5%) children had been injected previously, 211 (52.75%) had never been injected

Fig.9: Children that had /had not blood transfusion

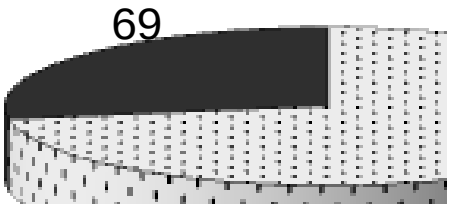

Fig.10
Hepatitis B Immunization status of the study population

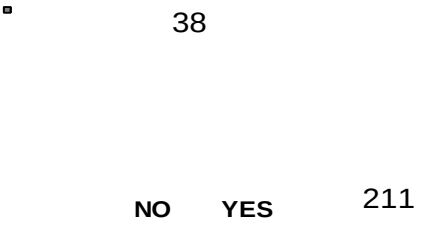

Fig.11.
Intramuscular Injection of the Children studied

DISCUSSION

Our knowledge of HCV infection in children is limited compared to adults. This is because there are fewer children than adults infected with HCV. Also, children are less likely to have symptoms from their HCV infection because symptoms are suggestive of a flu — like illness.

This study examined blood samples from randomly selected four hundred (400) children (116 males and 234 females). More of the children were in the age group of 15 — 17 years. This selection of the older children may be due to the fact that consent from parents, sample collection and information are more difficult to get from the smaller age groups. Majority of the children were Binis, reflecting the major tribe of the people where the study was done (Benin City).

Results from the study showed that only one child out of the four hundred (400) children screened tested positive to HCV antibody giving a prevalence rate of 0.25% within the population studied. The low incidence of hepatitis C in children in Benin City as observed in this study agrees with an earlier report on world wide prevalence of hepatitis C in children. (Schwimmer and Balistreri, 2000). In fact some authors have concluded that HCV transmission is largely restricted to infants born to HCV and / or HIV infected mothers (Thomas *et al*, 1998). The infected child in this study was a 17 — year old female from a public secondary school. Interestingly this infected child tested positive to HIV. Preliminary and confirmation tests for HIV were positive. This suggests a situation of co-infection, a possibility earlier reported by IDIC (Infectious Diseases and Immunization committee) 2003. In the study of co — infection with HIV, it has been shown that children of HIV and HCV co — infected mothers are more often infected by HCV after vaginal delivery (32%) than after delivery by ceasarian section (6%) (Paccagnini *et al*, 1995). The infected child in this study was delivered per vagina, but it was difficult to establish if the mother had HCV or HIV infection since she

refused to be tested. This child was also breast fed, although we could not prove a link of infection through breast milk as we could not establish if the mother was infected. Although this child had received intramuscular injections, it is difficult to link the injections as the cause of HCV infection because sterile disposable needles are currently used in Nigeria. However, HCV is more rapidly acquired after intramuscular injection than the other types of viral infections (HBV and HIV) (Garfein *et al*, 1998). Although there was no history that the infected child as an intravenous drug abuser, it has been noted that the rate of HCV infections among young injection drug users are four times higher than the rate of HIV infections (Garfein *et al*, 1998).

It was also confirmed in this study that being infected with hepatitis C does not imply a simultaneous hepatitis B infection. Hepatitis B virus test was carried out on 200 samples randomly chosen from the 400 children used for the study, including the sample of the child with HCV infection. The results were all negative.

Also, observations from the questionnaires completed by the children did not establish any relationship between hepatitis C and tribe, religion, educational status and place of birth. This may prove the point that HCV infection is not affected by such socio-cultural factors. The lack of influence by previous blood transfusion has been explained by several authors to be due to the introduction of anti HCV testing of all blood donations since 1990. The risk was reported to have fallen to 1 per 100,000 units (Donahue *et al*, 1992; Blajchrnan *et al*, 1995). However, in some African countries like Tanzania, blood safety still remains an issue of major concern in transfusion medicine as most of the donated blood is screened for HIV alone (Matee *et al*, 2006). Literature is scanty on the prevalence of hepatitis C in Nigerian children. This preliminary study therefore provides a basis for further research in this area. It shows a low prevalence rate of HCV amongst children in Benin City, Nigeria. This agrees with worldwide prevalence. It is recommended that to further reduce or eradicate HCV infection, all donated blood should be screened for HCV, women who attend antenatal clinics should be screened for HCV and those found to be positive should have ceasarian delivery. It is also hoped that advances in immunology and innovative approaches to immunization could make it likely that some form of vaccine for hepatitis C will eventually be developed.

REFERENCES

Blajchman, M.A., Bull, S.B., Feinman, S.V. (1995): Post — transfusion hepatitis: impact of non — A, non — B hepatitis surrogate tests. Lancet. 345, 21—25.

Bortolotti, F., Resti, M., Giacchino, R., Crivellaro, C., Zancan, L., Azzari, C., Gussetti, N. (1998): Changing epidemiologic pattern of chronic hepatitis C virus infection in Italian children. J. Pediatr. 133, 378—381.

Cheesbrough, M. (2000): District laboratory practice in tropical countries. Part 2. Cambridge University Press. Pp. 362 — 369 and 393 — 394.

Dhawan, V.K. (2004): Living with hepatitis C? Learn to safely and effectively protect your liver using clinically proven natural remedies. Hepatitis Central — Current Information on 1-lepatitis C and treatments for the medical professional. Pp. 1 — 18.

Donahue, J.G.., Munoz, A., Ness, P. (1992): The declining risk of post transfusion hepatitis C virus infection. N. Engi. J. Med. 327, 369 — 373.

Enamoto, N., Sato, C. (1995): The significance of HCV quasispecies. J. Vir. Hepat. 1, 267—272.

Garfein, R.S., Doherty, M.C., Monterroso, E.R., Thomas, D.L., Nelson, K.E., Viahor, D. (1998): Prevalence and incidence of hepatitis C virus infection among young adult injection drug users. J. Acquir. Immune Defic. Syndr. 1-lum. Retrovir. 18, 11 — 19.

http ://www.hepatitis-central, com/hcv4 atitise html

Infectious Diseases and Immunization Committee (IDIC). (2003): Vertical transmission of the hepatitis C virus: current knowledge and issues. http://www. cps .ca/engli sh/statements/ID/i97-O I . htrn.

Jonas, M.M. (2002): Children with hepatitis C. Hepatol. 36, 173 — 178. Jonas, M.M., Ott, M.J., Nelson, S.P., Badizadegan, K., Perez-Atayde, A.R. (1998): Interferon-alpha treatment of chronic hepatitis C virus infection in children. Pediatr. Infect. Dis. J. 17(3), 241 —246.

Matee, M.I.N., Magesa, P.M., Lyamuya, E.F. (2006): Seroprevalence of human immunodeficiency virus, hepatitis B and C viruses and syphilisinfections among blood donors at the Muhimbil National Hospital in Dar Es Salaarn, Tanzania. BMC Pub. Healt. 6, 21.

MMWR Recomm. Rep. (1998): Recommendations for prevention and control of hepatitis C virus (HCV) infection and HCV — related chronic disease. Centers for Disease Control and Prevention. 47, 1 — 39.

Monga, H.K., Rodriguez-Barradas, M.C., Breaux, K., Khattak, K., Troisi, C.L., Velez, M., Yoffe, B. (2001): Hepatitis C virus infection — related morbidity and mortality among patients with human immunodeficiency virus infection. Clin. Infect. Dis. 33(2), 240 — 247.

Paccagnini, S., Principi, N., Massironi, E. (1995): Perinatal transmission manifestation of hepatitis C virus infection in a high risk population. Pediatr. Infect. Dis. J. 14, 195 — 199.

Ruudot-Thoraval, F., Pawlotsky, J..M., Thiers, V. (1993): Lack of mother – to- infant transmission of hepatitis

C virus in human immunodeficiency virus seronegative women; A prospective study with hepatitis C virus RNA testing. Hepatol. 17, 772 —777.

Schwimmer, J.B., Balistreri, W.F. (2000): Transmission, natural history and treatment of hepatitis C virus infection in the pediatric population. Semin — Liver Dis. 20(1), 37 — 46.

Screiber, G.B., Busch, M.P., Kleinman, S.H., Korelik, J.J. (1996): The risk of transmission — transmitted viral infections. N. Engl. J. Med. 334,
1685—1690.

Sherman, K.E., Rouster, S.D., Chung, R.T.., Rajicic, N. (2002): Hepatitis C virus prevalence among patients infected with Human Immunodeficiency Virus: a cross — sectional analysis of the US adult AIDS Clinical Trials Group. Clin. Infect. Dis. 34, 831 —837.

Strader, D.B., Wright, T., Thomas, D.L., Seeff, L.B. (2004): Diagnosis, Management and Treatment of Hepatitis C. Amer. Assoc. Stud. Liver Dis. Committee on practice guidelines. 3, 1.

Thomas, D.L., Villano, S.A., Reister, K.A. (1998): Perinatal transmission of hepatitis C virus from human immunodeficiency virus type 1 infected mothers. Women and infants transmission study. J. Infect. Dis. 177, 1480—1490.

Thursz, M.R., Thomas, H.C., Hill, A.D. (1995): Host genetic factors influencing the outcome of hepatitis. New Engi. J. Med. A, 215 — 220.

Zakim, B., Boyer, T. (1982): Hepatology: A textbook of liver disease. Pp. 22 — 31. W.B. Saunders company, Philadelphia.