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Vertical Transmission of Hepatitis B Virus: A Major Risk Factor for Chronic Pediatric HBV Infection: A Case Report

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ABSTRACT

Infection caused by hepatitis virus (HBV) is a global public health issue affecting more than 350 million people. Vertical transmission of HBV infection during the prenatal period is the major cause of HBV transmission in endemic countries such as Pakistan. This study was undertaken to investigate the possible risk factors associated with vertical transmission of HBV.
We reported a case of 39 year old Pakistani female (170cm height, 55 kg weight) with chronic HBV infection; she was the mother of four daughters and two sons who were also infected with HBV infection. A written consent was the taken from the infected family. Blood samples were collected from the mother and her children (n=6) with mean age 9.5 years (1-6 years age) and were analyzed for HBV infection by ELISA. Active HBV infection was investigated using nested Polymerase chain reaction (PCR), while HBV genotypes were determined by multiplex PCR with type specific primers. All the blood samples were found positive for HBV DNA by PCR; which were further processed for genotype analysis. A considerable high rate of HBV infection was observed among all the members of infected family. The genotyping analysis indicates a high prevalence of genotype C (n=7). All the children were infected with HBV genotype C. Vertical transmission was found as a major risk factor for HBV acquisition. According to the best of our knowledge, this is the first case report showing the association between the mode of HBV transmission and its genotype in Khyber Pakhtunkhwa (KP), Pakistan. Genotype C might be a risk factor for vertical transmission of HBV.

KEYWORDS: Vertical transmission, Genotyping analysis, hepatitis B infection

1. INTRODUCTION

Globally HBV infection is major health problem and one of the most important etiological factors for the development of chronic liver disorders including serious end stage liver disorders such as liver cirrhosis and hepatocellular carcinoma (HCC) (Murphy 1996, Prescott, Harley & Klein 2005).

It is estimated that approximately 400 million people around the world are infected with HBV. Infection caused by HBV has been characterized as one of the most common liver infection by World Health Organization (WHO) affecting more than 350 million people throughout the world (Dokanehiifard, Bidmeshkipour 2009,Guirgis, Abbas & Azzazy 2010). Vertical transmission is the transmission of HBV infection from an infected to healthy child during birth. It is one of the major causes of HBV acquisition in endemic regions of the world which often leads to chronic hepatitis, cirrhosis, and hepatocellular carcinoma. It can be prevented by the administration of passive and active immunoprophylaxis with hepatitis B immunoglobulin (HBIG) combined with hepatitis B vaccine (Lee, Gong, Brok, Boxall & Gluud 2006). In 2001-2004, Pakistan received a grant from Global Alliance for vaccines and Immunization (GAVI), which successfully enabled EPI (Expanded Programme on Immunization) to introduce HB vaccine on routine basis while HBV vaccination as a part of EPI was launched in 2004 in a national vaccination campaign which has been successfully integrated in routine immunization schedule of all neonates with estimated hepatitis B immunization coverage of 65 percent (Moayed, Farahnaz, Lankarani

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2007). We report here amultigravida woman with chronic HBV infection and whose all children were also infected with HBV. A written consent was taken from the infected family.

2. CASE REPORT

A 39-year-old woman (170cm height, 55 kg weight) was presented outpatient to department (OPD) of Khyber teaching hospital (KTH), Khyber Pakhtunkhwa (KP), Pakistan in November 2013. She belongs to Jamrud, the tribal area of KP, came to the OPD with the symptoms of fatigue, headache, loss of appetite and vomiting. Based upon her medical history, she was tested for hepatitis B surface antigen (HBsAg) in order to make any conclusion about her disease status. Her results of initial HBsAg screening were found positive. During the subsequent investigations she revealed that she was diagnosed as HBsAg positive ten years back when had came to deliver her last baby at the same hospital. She further enclosed that baby was immunized immediately after her delivery. Due to poverty and lack of health facilities she could not get the treatment appropriately. She was reinvestigated by her physician to verify and check her disease status. Her reports came out to be discouraging. She was found to be positive for HBsAg (ELISA DRG Instruments, Germany). Her active viral load was found to be 7.1×10^5 IU/ ml (by MiniOpticon Real-Time PCR System). She was also found positive for hepatitis B virus e antigen (HBeAg= 131.61 by microparticle enzyme immunoassay (MEIA), Abbott IMX® *(*Abbott Lab., Abbott Park, IL,USA). Her liver function tests illustrates the concentration of total bilirubin to be 0.5mg/dl, serum glutamic-pyruvic transaminase (SGPT) to be 530 U/l, alkaline phosphatases to be 218U/L, total protein content was found to be 6.9U/L and the concentration of albumin was found to be 3.7 g/dl. Based upon her reports she was found as chronic HBV patient. During the her subsequent visits to the hospital she decided to investigate all her children including her four daughters and two sons with mean age 9.5 years (range: 0-16) for hepatitis B surface antigen (HBsAg). Her children reports were also found positive for HBsAg.

On 5 January 2014, blood samples were taken from this infected family and were processed for genotyping analysis in an attempt to correlate the mode of HBV transmission and its genotype. DNA extracted from the serum samples from the mother and her children were subjected to nested PCR for the detection of HBV surface genes. A 230bp amplicon was generated by nested PCR which was further subjected for genotype determination by multiplex PCR with type specific primers (TSP-PCR) as previously described (Farazmanfar, Haghshenas, Janbabai, Azadeh, Sharifian, Taghipour 2012). The results indicates genotype C as the most prevalent among all the member of infected family (n=7), all the children (n=6) were infected with HBV genotype C.

3. DISSCUSSION

Vertical transmission is the major cause of HBV acquisition during early childhood in the regions of the world with high HBV endemicity including Pakistan (Jonas 2009). High HBV DNA levels and passive-active immunoprophylaxis failure are main contributing factors causing HBV infection during perinatal period (Lavanchy 2004, CDC Morbidity & Mortility Weekly Reports 2011). Preventing vertical transmission can significantly decrease the burden of pediatric HBV infection.In the present study we found genotype C as the most prevalent among all the member of infected family (n=7), all the children (n=6) were infected with HBV genotype C. A number of studies undertaken earlier confirmed the correlation between HBV genotype C and vertical transmission (Liu, Dong, Zhang, Li, Wo, Lu, Chen, Wang & Ruan 2009, Nie, Jin, Zhang, Xu, Chen & Zu 2011, Inui, Komatsu, Sogo, Nagai, Abe & Fujisawa 2007). In the present study vertical transmission was found as the major cause of HBV acquisition among all the children. The patient in this case belongs to a very poor socioeconomic status and was deprived of basic health facilities. Her high HBV-DNA level during her last pregnancy was the main cause of immunoprophylaxis failure given to the baby. This is the first case report showing the association between the mode of HBV transmission and its genotype in Khyber Pakhtunkhwa (KP), Pakistan. Genotype C might be a risk factor for vertical transmission of HBV. Routine HBV screening during pregnancy along with strict immunization strategies should be taken in practice to minimize the risk of vertical transmission.

4. CONCLUSION

The chances of vertical transmission can be minimized by establishing mother to child health care centers (MCH) where trained staff certified by health regulatory authorities should be appointed and a very effective check and balance system should monitor such MCH centers. Furthermore women in childbearing age must have a free access to the health care centers where quality antiviral therapy can be carried out to avoid vertical transmission of hepatitis B.

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