

## Review Article

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# Is it Safe for a Mother Infected with Hepatitis B Virus to Breastfeed Her Baby?

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### Summary:

*One third of the world's population has been infected by the hepatitis B virus (HBV), causing an enormous burden of chronic hepatitis, cirrhosis, and hepatocellular carcinoma. Hepatitis B virus is transmitted through contact with blood and blood products, by sexual contact, through close contact between children (horizontal transmission), or by perinatal transmission from a carrier mother to her baby. In Asia, perinatal transmission is the major mode of transmission and those who become infected perinatally with HBV are most likely to develop chronic infection. The question of whether breastfeeding by HBV-positive mothers is an additional mechanism by which infants may acquire HBV infection, has been asked for many years. Although small amounts of hepatitis B surface antigen (HBsAg) have been detected in some samples of breast milk, there is no evidence that breastfeeding by HBV-carrier mothers increase the risk of mother-to-child transmission of HBV. Infants born to known hepatitis B positive women should receive hepatitis B immune globulin (HBIG) and hepatitis B vaccine, effectively eliminating any theoretical risk of transmission through breastfeeding. However, neither screening of pregnant women for HBV infection nor use of HBIG is feasible in most developing countries. Routine immunization of infants with hepatitis B vaccine is therefore recommended by the World Health Organization. Bangladesh has already included hepatitis B vaccine as part of routine childhood immunization in EPI program since 2003. Also the risk must be balanced against the increased risk of morbidity and mortality due to malnutrition and diarrheal or other infectious diseases associated with replacement feeding. Malnutrition is responsible, directly or indirectly, for 6.5 million under 5 deaths annually. Thus, even where HBV infection is highly endemic and immunization against HBV is not available, breastfeeding remains the recommended method of feeding.*

**Keywords:** *Hepatitis B virus, Perinatal transmission, Breastfeeding, Immunoprophylaxis*

### Introduction:

Hepatitis B is an infection caused by the hepatitis B virus (HBV) which affects the liver, causing damage to liver cells. Chronically infected persons with HBV are at increased risk for developing chronic liver disease or liver cancer in later life. Young children who become infected with HBV are the most likely to develop chronic infection.<sup>1</sup> In areas where persistent infection is highly endemic, transmission is mainly either perinatal, from a carrier mother to her newborn, or through close contact between children (horizontal transmission).<sup>2,3</sup> Breastfeeding has been suggested

as an additional mechanism by which infants may acquire HBV infection, because small amounts of hepatitis B surface antigen (HBsAg) have been detected in some samples of breast milk from women who tested positive for **hepatitis B**.<sup>3</sup> Concern have been expressed by scientists, health professionals, environmentalists and mothers about the potential risks posed by the presence of this hepatitis B antigen in breast milk. The question of whether breastfeeding plays a significant role in the transmission of hepatitis B has been asked for many years. It is important given the critical role of breastfeeding and the fact that about 5 percent of mothers worldwide are chronic HBV carriers.<sup>4</sup>

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Although HBsAg can be detected in breast milk, several studies have shown that breastfeeding by hepatitis B positive mothers have not been demonstrated to be a mode of transmission of the virus.<sup>5,6</sup> Infants born to known hepatitis B positive women should receive hepatitis B immune globulin (HBIG) and hepatitis B vaccine at birth, effectively eliminating any theoretical risk of transmission through breastfeeding.<sup>6,7</sup> Also this risk must be balanced against the increased risk of morbidity and mortality due to malnutrition and diarrheal or other infectious diseases associated with replacement feeding.<sup>8</sup> Malnutrition is responsible, directly or indirectly, for about 60 percent of the 10.9 million deaths annually among children under 5 years of age.<sup>9</sup> Malnutrition among infants and young children, why remains as one of the most severe global public health problems. That is among the main reasons World Health Organization (WHO) strongly supports breastfeeding and all infants receive hepatitis B vaccine as part of routine childhood immunization.<sup>10</sup>

In this paper we reviewed the issues relevant to breastfeeding and HBV transmission and provided guidance regarding breastfeeding by HBV carrier mothers.

### **Breastfeeding:**

Breast milk is the ideal in infant nutrition, and breastfeeding the optimal delivery system. Appropriate feeding practices are essential for the growth, development, health, nutrition, and survival of infants and children everywhere.<sup>8</sup> In addition to meeting nutritional needs, breast milk provides increased resistance to diseases, allergy protection and psychosocial development, make it the most important, cost effective substance we have in medicine today.<sup>11</sup> It has been postulated that breastfeeding may also be related to the prevention of some adult health problems such as obesity, diabetes and coronary heart disease.<sup>12,13</sup> There is a considerable risk of morbidity and mortality among infants who are not breastfed. Numerous benefits of breastfeeding for mother (e.g., decreased risk for breast cancer) are well documented. In a recent recommendation, WHO and UNICEF have urged to strengthen activities 'to protect, promote and support exclusive breastfeeding for 6 months as a global public health recommendation, followed by safe and appropriate complementary foods, with continued breastfeeding for up to 2 years of age or beyond'.<sup>14</sup>

### **Hepatitis B:**

Hepatitis B virus (HBV) is a double-stranded DNA virus in the *Hepadnaviridae* family, a highly infectious virus – 50 to 100 times more infectious than the AIDS virus (HIV). Hepatitis B virus infection is of major public health importance worldwide. It can cause asymptomatic infection, clinical acute hepatitis, fulminant hepatitis, or persistent infection which is known as the chronic carrier state.<sup>1</sup> Chronic hepatitis B is a serious public health problem.<sup>1</sup> Hepatitis B virus is widespread in Asia and sub-Saharan Africa, with 8 to 15 percent of the population being chronically infected.<sup>1</sup> (Fig.-1). Globally there are over 350 million chronic carriers of HBV who are at high risk of developing severe sequelae including chronic active hepatitis, cirrhosis, and primary hepatocellular carcinoma, complications which kill more than 1.2 million persons per year.<sup>1,4</sup> The risk of death from HBV-related liver cancer or cirrhosis is approximately 25 percent for persons who become chronically infected during childhood.<sup>1</sup> Worldwide, hepatitis B has been reported to be the 10<sup>th</sup> leading causes of death.<sup>4</sup> Up to 80 percent of the world's primary liver cancer, which is currently the fifth most frequent cancer worldwide, is associated with chronic hepatitis B.

Hepatitis B virus is transmitted through contact with blood or blood products, by intimate contact such as sexual intercourse, or through close contact between children (horizontal transmission).<sup>1</sup> According to the Centers for Disease Control (CDC), HBV is not spread through food or water, sharing eating utensils, breastfeeding, hugging, kissing, coughing, sneezing or by casual contact.<sup>15</sup> In highly endemic areas a major route of transmission from an infected mother (who is often unaware that she is a carrier and has chronic hepatitis B) to her baby is via contact with maternal blood and other body fluids during or soon after delivery. Being a carrier during pregnancy does not seem to cause damage to the unborn baby and when infection occurs,, hepatitis B in neonates rarely results in serious clinical illness. Rather, the principal morbidity of perinatal transmission is the development of a chronic HBsAg carrier state in neonates with the subsequent risk for cirrhosis and hepatocellular carcinoma.<sup>16</sup> Although cesarean delivery has been proposed by some researchers as a means of reducing mother-to-child transmission (MCT) of HBV,<sup>17</sup> other researchers found no difference in maternal-infantile transmission of HBV between women with cesarean section and natural birth.<sup>18</sup> Delivery by cesarean

section for the purpose of reducing MCT of HBV is not presently recommended by either the Centers for Disease Control (CDC)<sup>15</sup> or the American College of Obstetricians and Gynecologists (ACOG).<sup>19</sup>

For women developing acute hepatitis B in the third trimester, the rate of transmission to neonates' approaches 90 percent, virtually all becoming chronic carriers. In contrast, hepatitis B acquired earlier in pregnancy results in perinatal transmission in only 10 percent of cases.<sup>20,21</sup> This disparity is related to the fact that mothers infected earlier in pregnancy have generally cleared HBsAg by the time of labor and delivery which would result in a much lower rate of transmission to the neonate. In Asia approximately 40 percent of HBV carrier women of childbearing age are also positive for the hepatitis 'e' antigen (HBeAg) and these mothers have a 70 to 90 percent chance of infecting their newborn perinatally.<sup>22</sup> In Asia, perinatal transmission accounts for approximately 25 to 30 percent of the carrier pool. Young children who become infected with HBV are the most likely to develop chronic infection.<sup>1,23</sup> About 90 percent of infants infected during the first year of life, 25 percent of infected young children and fewer infected adults develop chronic infection.<sup>1</sup>

Vaccines are available for the prevention of hepatitis B. According to WHO recommendations, many countries including Bangladesh have included hepatitis B vaccine as part of routine childhood immunization. Three injections are given as pentavalent vaccine (along with diphtheria, pertussis, tetanus and Hib vaccines) at 6, 10 and 14 weeks of age. In recent

years, Lamivudine has been used in the latter half of pregnancy in an attempt to prevent perinatal transmission of hepatitis B virus infection with mixed results. One study suggests that, in highly viremic HBsAg-positive mothers, reduction of viremia by Lamivudine therapy in the last month of pregnancy may be an effective and safe measure to reduce the risk of child vaccination breakthrough,<sup>24</sup> whereas another study opined that, Lamivudine therapy might not prevent perinatal transmission of HBV infection in every newborn.<sup>25</sup> Results of a recent randomized, double-blind, placebo-controlled study suggest that, Lamivudine reduced HBV transmission from highly viremic mothers to their infants who received passive/active immunization.<sup>26</sup> However, the data is limited, and this approach should be evaluated in a large controlled trial.

**Breastfeeding and Hepatitis B:**

Even though the HBV antigen has been detected in breast milk, examination of relevant studies indicates that there is no evidence that breastfeeding by HBV carrier mothers increases the risk of mother-to-child transmission of HBV.<sup>3,27</sup> A follow up study of 147 infants born to mothers known to be carriers of HBV in Taiwan found similar rates of HBV infection in 92 children who were breastfed compared to 55 who were bottle fed.<sup>3</sup> Another study in Britain, involving 126 subjects, also showed no additional risk for breastfed versus non breastfed infants of carrier mothers.<sup>28</sup> These findings suggest strongly that breastfeeding of the infant by an HBsAg-positive mother poses no additional risk for acquisition of HBV infection by the



**Fig.-1.** Geographic Distribution of Chronic Hepatitis B Virus Infection Worldwide, 2006

infant. There is no need to delay initiation of breastfeeding until after the infant is immunized.<sup>29</sup>

Experts on hepatitis, however, do have concerns that breast pathology such as cracked or bleeding nipples or lesions with serous exudates could expose the infant to infectious doses of HBV.<sup>30</sup> Appropriate hepatitis B immunoprophylaxis can prevent the development of persistent carrier state in such situation.<sup>5,6</sup> World Health Organization recommends that all infants receive hepatitis B vaccine as part of routine childhood immunization, the first dose to be given within 48 hr of birth when feasible.<sup>10</sup> Breastfeeding remains the recommended method of feeding.<sup>10</sup> A statement prepared jointly by the Global Programme for Vaccines and Immunization (GPV) and the Divisions of Child Health and Development (CHD), and Reproductive Health (Technical Support) (RHT) World Health Organization recommends that active immunization with hepatitis B vaccine is effective for the prevention of both perinatal and horizontal transmission of HBV.<sup>30</sup> Immunization can prevent development of the persistent carrier state in 70 to 90 percent of infants of carrier mothers, and in up to 95 percent of infants who are infected horizontally.<sup>31-33</sup> Administration of HBIG within 24 hours of birth together with the first dose of vaccine increases the protection up to 85 to 90 percent in infants of HBV carrier mothers.<sup>27</sup>

However, neither screening of pregnant women for HBV infection nor use of HBIG is feasible in most developing countries. Routine immunization of infants with hepatitis B vaccine is therefore recommended, the first dose to be given within 48 hours of birth, and subsequent doses with routine childhood immunizations. But in majority of cases contact with the immunization system does not take place for several weeks after birth. Delivery of hepatitis B vaccine at birth may be possible with clinic or hospital deliveries but is more difficult following home deliveries, where majority of deliveries take place in our country.<sup>34</sup> A dose of hepatitis B vaccine around the time of birth is more important in Asia where perinatal transmission is commoner. Infants who have received their first dose of vaccine can safely breastfeed.<sup>35</sup>

Introduction of hepatitis B vaccine as part of routine childhood immunization in endemic areas, as recommended by WHO, will substantially reduce perinatal transmission, and virtually eliminate any risk of transmission through breastfeeding. But this would not be possible without birth dose of hepatitis B

vaccine in areas where persistent HBV infection is highly endemic. Immunization of infants will also prevent infection from all other modes of HBV transmission. WHO and UNICEF recommend that all infants be exclusively breastfed for at least 4 and if possible 6 months, and that they continue to breastfeed up to two years of age or beyond with the addition of adequate complementary foods after completion of 6 months of age.<sup>8</sup> Government of Bangladesh has also recommended exclusive breastfeeding for 6 months. There is a considerable risk of morbidity and mortality among infants who are not breastfed.

### Importance of Hepatitis B Birth dose?

Hepatitis B vaccine administered to newborns before hospital discharge may minimize the risk of infection due to errors in maternal HBsAg testing or reporting, or from exposure to persons with chronic hepatitis B infection in the household. It is estimated that over 40% of infants born to HBsAg-positive mothers will become infected without prophylaxis. An estimated 90% of infants who become infected by perinatal transmission develop chronic HBV infection and as many as 25% will die from chronic liver disease as adults. Although not a substitute for immunoprophylaxis, routine administering Hepatitis B vaccine to infants at birth regardless of the mothers HBsAg status can serve as a safety net. Studies have shown that administering hepatitis B vaccine without HBIG beginning  $\leq 12$  hours after birth in a 3- or 4-dose schedule can prevent 70-95% of perinatal HBV infections among infants born to HBsAg-positive mothers.

Noted medical groups – the Advisory Commission on Immunization Practices (ACIP), American Academy of Pediatrics (AAP), and American Academy of Family Physicians – recommended health care providers routinely administer the first dose of hepatitis B vaccine to infants soon after birth and before hospital discharge.<sup>36</sup>

### Hepatitis B birth dose acts a safety net when –

- A pregnant woman is HBsAg positive but her status is not communicated to the nursery; is misinterpreted, or is mistranscribed in her prenatal records.
- A chronically infected woman is tested by mistake for hepatitis B surface antibody (anti-HBs) instead of HBsAg.



- A pregnant woman is not tested for HBsAg prenatally or in hospital at time of delivery.
- A high-risk woman tests negative early in pregnancy but develops hepatitis B infection later in pregnancy.
- A mother is HBsAg negative but the infant is exposed postnatally from another family member or caregiver. This accounts for two-thirds of childhood transmission.

**Conclusion:**

With appropriate immunoprophylaxis, including hepatitis B immune globulin and hepatitis B vaccine, breastfeeding of infants of chronic HBV-carriers poses no additional risk for the transmission of the hepatitis B virus. There is no evidence that breastfeeding from a HBV-infected mother poses an additional risk of HBV infection to her infant, even without immunization.<sup>3,27,30</sup> Thus, even where HBV infection is highly endemic and immunization against HBV is not available, breastfeeding remains the recommended method of infant feeding.

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