
Prevalence of Hepatitis B in an Indigent, Multi-ethnic Community Clinic Prenatal Population

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Perinatal infection of hepatitis B virus (HBV) from an infected asymptomatic woman to her offspring is now a preventable disease. A chart review was undertaken to document the prevalence of asymptomatic HBV infection in a high-risk, predominantly minority, indigent, and immigrant family practice clinic population and to evaluate the frequency of accepted known risk factors for those subjects with positive hepatitis B surface antigen (HBsAg) screening tests. Records for 464 pregnant women entering the prenatal program between January 1, 1983, and April 30, 1987, were reviewed. Twenty-three (5.3%) were found positive for the HBsAg, all were asymptomatic. Results of a logistic regression on multiple risk factors for HBV infection revealed that ethnicity was the sole predictor of a positive HBsAg screening test, with 13% of the Asian patients and 1% of the Latino subjects positive for HBsAg. Other historical factors such as previous sexually transmitted disease and past history of transfusion were not predictive. These results reaffirm that a screening program for asymptomatic HBV infection in selected prenatal populations can identify a significant number of infants at risk for perinatal infection.

Transmission of hepatitis B virus (HBV) from an asymptomatic chronic carrier mother to her newborn infant has been shown to result in acute neonatal hepatitis and in long-term serious liver disease.¹ Once infected, these infants can also serve as reservoirs capable of infecting other susceptible individuals. Worldwide, over 200 million people are infected with HBV, perhaps the majority victims of perinatal transmission. Individuals infected with the HBV typically are identified by testing positive for the hepatitis B surface antigen (HBsAg). Data from China warn that infants born to infected mothers have a risk as high as 90% of developing the chronic carrier states if the mother is also positive for the hepatitis Be antigen (HBe Ag).^{2,3} It is estimated that these infants have a 20% to 30% likelihood of eventually dying as a consequence of that infection.¹ Thus, perinatal hepatitis B viral infection has

the potential for being responsible for untold morbidity and mortality. Fortunately, immunization of these infants immediately after birth using hepatitis B immune globulin and hepatitis B vaccine can reduce the probability of the chronic carrier state by as much as 90% and reduce the risk of acute neonatal hepatitis and serious chronic liver disease.⁴⁻⁷

The Centers for Disease Control (CDC) have recently revised their recommendations to call for routine screening of pregnant women during the prenatal period so that infants who are candidates for immunization against HBV can be identified.⁸ Previously, the CDC had recommended screening only women at high risk for HBV infection. Most of the data used to amend the prior recommendations were derived from studies of pregnant women in labor at large urban metropolitan hospitals.⁹⁻¹² In addition, the prevalence of associated risk factors to asymptomatic HBV infection in a US prenatal population has rarely been reported. A MEDLINE literature search was unable to identify reports documenting HBV infection in a family practice prenatal population. A chart review was undertaken to identify the prevalence of asymptomatic HBV in a family practice clinic prenatal population known to serve a population at high risk for HBV and to document the role of other risk factors for HBV infection in this population.

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METHODS

Description of Site

San Antonio Neighborhood Health Center is a community-based, federally funded clinic located in East Oakland, California. The clinic has been in operation since 1975 and serves a primarily indigent, immigrant, ethnic minority population. In 1979, the clinic established a prenatal program, which enrolls approximately 120 medically low-risk pregnant women per year. Prenatal care is provided by a team of family physicians, midwives, nurse practitioners, social workers, physician assistants, and nutritionists, with backup from community obstetricians.

Patient Population

The clinic has over 2500 enrolled patients, of which over 50% are active annually. In 1987, the Hispanic population accounted for 55%, Asians 27%, blacks 7%, whites 3%, and others 8% of all patient visits. Fifty-five percent of the active patients were at the poverty line or below. Women accounted for 62% of the total visits and 32% were in the reproductive ages of 15 to 44 years. Although detailed data regarding place of birth are not available, clinic personnel report that approximately 50% to 60% of adults are foreign born.

Prenatal patients were enrolled into the prenatal program on a first-come, first-serve basis until 10 patients completed the roster for the projected estimated date of confinement per month. In most instances the patients were enrolled by the 16th week of their pregnancy. All patients were screened by one of the providers, and questions regarding gravidity, parity, past medical history, and past pregnancy history were reviewed. In keeping with the family practice focus, patients considered at high risk for medical complications* were referred to the county perinatal group for management. Specific questions regarding risks of hepatitis were not necessarily elicited. Because of an assumed high number of prenatal patients at risk for asymptomatic HBV infection, routine screening of patients in the prenatal program for the HBsAg was instituted in 1983. Laboratory testing was performed on the first or second prenatal visit along with the routine prenatal panel by Western Laboratories using an enzyme immunoassay (Abbott Laboratories, North Chicago, Ill). Infants born to mothers who are HBsAg-positive were immunized at birth with HBV immune globulin and HB vaccine and then

*High risk was defined as a history of diabetes mellitus, hypertension, multiple unexplained spontaneous abortions, incompetent cervix, intravenous drug abuse, and women presenting during the third trimester without previous prenatal care.

TABLE 1. ETHNICITY AND RATE OF HBsAg POSITIVITY OF PRENATAL POPULATION (N = 430)

Ethnicity	No. (%)	HBV Positive No. (%)
Latino	195 (45.0)	2 (1.0)
Asian	163 (38.0)	21 (12.9)
Black	57 (13.0)	0 (0)
White	7 (1.6)	0 (0)
Other	8 (1.9)	0 (0)

HBsAg—Hepatitis B serum antigen
HBV—Hepatitis B virus

follow-up HB vaccine 1 month and 6 months later in accordance with the schedule outline by the Centers for Disease Control.

Statistical Methods

The chi-square statistic, Fisher's exact test, and logistic regression analysis were used to analyze results comparing independent variables with a positive HBsAg test with those with a negative test.

RESULTS

Charts were reviewed for 504 enrolled prenatal patients. The data were adjusted to reflect enrollment in this study only once for each prenatal patient. Of the 38 patients who were found to be returning for prenatal care in a subsequent pregnancy, only the first enrollment was included. Thirty-six cases did not contain evidence of HBsAg results, and these cases were excluded, leaving 430 usable cases.

The greatest number of the women were Latino, followed by Asian, black, white, and other (Table 1). Country of birth was available for only 161 of the Latino and 153 of the Asian subjects. Of those Latinos who had place of birth recorded, 65% were born in Mexico, 22% in the United States, 7% in El Salvador, and 1% in Puerto Rico. Thirty-four of the Latino subjects had no documentation of place of birth. Similarly, of Asian patients who had place of birth recorded, 55% were born in China or Taiwan, 24% in Vietnam, 4% in the Philippines, 3% in Laos, and 1% in the United States. Eighteen of the Asians did not have a place of birth documented in the chart.

The median age for the 430 patients was 26 years with 44% between the ages of 15 to 24 years and 48.8 between the ages of 25 to 34 years. One hundred fifty-six of the subjects were primigravida, and 195 were primipara.

Twenty-three of the women were found to be positive for

TABLE 2. WOMEN FOR WHOM PRENATAL HBsAg SCREENING WAS PREVIOUSLY RECOMMENDED

Women of Asian, Pacific Island, or Alaskan Eskimo descent, immigrants or born in the United States
Women born in Haiti or sub-Saharan Africa
Women with any of the following histories: Acute or chronic liver disease Work or treatment in a hemodialysis unit Work or residence in an institution for the mentally retarded Rejection as a blood donor Blood transfusion on repeated occasions Frequent occupational exposure to blood in medicodental settings Household contact with a hepatitis B virus carrier or a patient undergoing hemodialysis Multiple episodes of venereal disease Percutaneous use of illicit drugs

From Centers for Disease Control¹⁴

HBsAg (prevalence rate of 5.3%). None of the 23 was recorded as being symptomatic at the time of the screening test. Twenty-one of the 23 positive subjects were identified as Asian (10 Vietnamese, 10 Chinese, and 1 Filipino) yielding a prevalence of 12.9% for Asians alone (95% confidence limits of 8.7% to 19.1%). Ten of these HBsAg-positive Asians were also positive for HBe Ag (45% of Asians who were HBsAg positive).

Two of the subjects positive for HBsAg were Latino (prevalence of 1.0%, 95% confidence limits between 0.11% and 3.3%). Both of these patients were born in Mexico. One of these subjects was retested in the third trimester and found to be HBsAg negative. No follow-up HBs-antibody or HBe-antibody testing was noted in the record for this patient.

HBe Ag determination was done on 21 of the 23 HBsAg-positive subjects; 11 were also positive for HBe Ag, and 10 were negative. Two of these patients had only HBsAg measured. Aminotransferase determinations were done on 13 HBsAg-positive patients, and all results were found to be normal.

Except for Asian ethnicity, none of the HBsAg-positive women was recorded as having other risk factors for HBV infection as previously defined by the Centers for Disease Control (Table 2).

Of the HBsAg-negative women (409), 24 (5.9%) of the patients had a history of previous sexually transmitted diseases recorded: 17 subjects reported that they had had gonorrhea diagnosed in the past, 2 had had herpes, 2 had had syphilis, and 1 had had *Chlamydia*. Eleven of the HBsAg-negative women reported a previous history of blood transfusions.

Three patients were noted to have a previous history of

hepatitis (one with hepatitis A, the other two with a type not specified). Follow-up testing showed that one of these subjects had a mildly elevated liver function test but a negative HBsAg. The other two patients were negative for HBsAg and had normal serum aminotransferase values.

Even though a history of intravenous drug abuse was a criterion for exclusion from the program, two women reported a past history of intravenous drug abuse. Six had a history of an immediate family member with a history of liver disease. Two of the six with a family history of liver disease were positive for HBsAg.

The regression analysis identified ethnicity as the only independent variable of significance ($P < .001$). Other variables such as age, gravidity, parity, or the presence of known risk factors for HBV infection were not found to be predictive.

DISCUSSION

Perinatal transmission of HBV is known to occur from symptomatic and asymptomatic women to their infants. Previous studies have identified the risk of transmission of the hepatitis B virus from an infected mother to her newborn to range from less than 10% to as high as 90% depending on the acuity of the infection and on the serological profile of the mother.¹³⁻¹⁵ If the mother acquires the virus late in pregnancy and is in the acute stages, the risk of transmission may be as high as 60%.¹⁶ In addition, if the mother is a chronic carrier and possessed the hepatitis e antigen marker, the risk of transmission approaches 90%. Perhaps only 10% of mothers who have a serological profile known to be low risk for perinatal transmission—positive for hepatitis B surface antigen and for hepatitis B antibody—will transmit the virus to the infant.¹⁶ Nonetheless, these infants may still develop serious and occasionally fatal fulminant hepatic failure.^{17, 18}

The long-term consequences of neonatal HBV infection have not been clearly established, but one often cited study reports that as many as 20% to 30% of infants infected at this early age will eventually die of the long-term consequences of this infection.¹ The exact mechanism leading to liver damage appears to be related to the ability of the HBV to integrate into the genome to the host hepatocytes.¹⁹ Numerous studies worldwide suggest that hepatitis B viral infection has the capacity to confer on perinatally infected infants a high likelihood of such significant chronic sequelae as chronic active hepatitis, cirrhosis, and hepatocellular carcinoma. In fact, the incidence of HBV-related liver cancer in China makes this virus the leading cause of cancer-related deaths in men.¹⁹⁻²¹

Fortunately, immunization programs that utilize a combination of hepatitis B vaccine and hepatitis B immune

TABLE 3. PREVALENCE OF HBsAg POSITIVITY IN LATINO PRENATAL PATIENTS

Author	Designation	HBV +/Total	Prevalence (%)
Jonas et al ¹¹	Columbia	2/116	1.7
	Cuba	2/550	0.4
	Panama	1/16	6.3
Kumar et al ¹³	Hispanic	3/243	1.2
Friedman et al ²⁴	South/Central America	4/24	16.7
	Puerto Rico	0/53	0
Fehrs et al ²⁷	Hispanic	1/303	0.3
Arevalo	Latino	2/195	1.0
Total		15/1500	1.0

HBV—Hepatitis B virus, + denotes positive

globulin have been shown to reduce the chronic carrier rate in these at-risk infants and, in turn, decrease the likelihood of the development of acute and chronic complications. Prenatal screening programs directed at the prevention of the HBV chronic carrier state have gained wide acceptance in areas of high HBV endemicity.²²

Much of our understanding regarding perinatal hepatitis B viral infection originates from studies of populations in Asia; only limited data exist on perinatal transmission rates in the United States.

This study confirms previous findings that ethnicity is predictive of an increased risk for asymptomatic HBV infection in selected prenatal populations. Both the Asian and Latino populations—most of whom were recent immigrants—were shown to have prevalence rates significantly higher than the general population (0.2% to 0.3%).

Previous studies in the United States have identified certain Asian prenatal populations to have rates as high as 13%, consistent with the findings in this population.^{6,23} Moreover, the relatively high rate of HBe Ag positivity in this Asian sample (45%) suggests a high potential for transmission in this population.

An extensive literature search identified only four studies that evaluated the frequency of HBsAg positivity in US Latino prenatal patients.^{11,13,24-27} These studies reported rates of 0.3% to 16.7%. Although the numbers in each study are small, when combined with the findings reported here, the aggregate prevalence in these studies is 1.0% (Table 3; 15 positive HBsAg out of 1500 subjects). Thus, Latino prenatal patients appear to constitute a high-risk population.

Other known risk factors for hepatitis B viral infection were not found to be predictive of a positive maternal HBsAg test. Most certainly, the family practice focus of

the prenatal program, excluding patients presenting late for prenatal care or with a history of intravenous drug abuse (however, two such patients were found to have such a history) reduced the number of subjects potentially at high risk for HBV. In addition, the frequency of other risk factors known to be predictive of HBV infection, such as a history of blood transfusions, multiple episodes of venereal disease, history of chronic liver disease, etc, were too low in this sample to evaluate adequately as independent predictors.

Of interest was the relatively low percentage of the subjects who had documentation of a past history of sexually transmitted disease, much lower than similar studies (rates 9% to 16%). Four hypotheses arise to account for this surprisingly low prevalence. First, in spite of the lower socioeconomic status of these patients, they, indeed, have a low risk for sexually transmitted diseases. Second, the true rate of previous sexually transmitted disease diagnosis in this population is in fact higher, but patient recall for this information is poor. Third, these predominantly immigrant, indigent, minority patients may be reluctant to reveal a past history of a highly personal nature such as past sexually transmitted diseases. Fourth, and the most plausible, historical data-gathering in a busy primary care practice is done in a cursory fashion, and important historical information is frequently missed. Interestingly, if the fourth hypothesis is true, then historical information of this nature in these populations is unreliable, a fact that screening programs must take into account.

Recent studies have shown that the routine use of maternal risk assessment to identify candidates for screening for asymptomatic HBV infection is insensitive and may miss as many as 50% of positive women.⁹⁻¹³ In addition, the cost effectiveness of routine prenatal screening has been found to be economically justified if the prevalence of HBsAg positivity exceeds 0.06%, substantially below the 5.3% in this population.²⁵ Thus, in this predominantly immigrant population, routine screening appears to be justified. Kane and colleagues²⁶ from the CDC have estimated that the implementation of a routine prenatal screening program for HBV would allow treatment of 16,000 infants born to chronic carriers and could prevent 3500 children from becoming chronic HBV carriers in the United States annually.

Several limitations to this study merit discussion. While chart audits are useful in evaluating associations among objective factors such as age and HBsAg-positivity, they have substantial inherent weaknesses in the appraisal of such subjective factors as historical data. Moreover, the screening test utilized to evaluate HBV infection, the Abbott enzyme immunoassay, is highly reliable, but the sensitivity and the predictive value have not been tested in larger populations of low prevalence. If the false-positive rate is on the order of 0.5%, then one false-positive result

would be expected out of 200 tested, which could theoretically explain the positives in the Latino population. Thus further evaluation of a large Latino prenatal population confirming a positive HBsAg test with HBV-DNA, HB core antibody, or polymerase chain reaction would be warranted.

Although the results presented here cannot be generalized to all family practice prenatal populations, these data reaffirm that selected populations in the United States are at risk for HBV perinatal transmission.

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